HEALTH AND SAFETY PLAN

Libby Asbestos Project
Libby, Montana

Contract No. DTRS57-01-D-30006
Task Order No. T0005

Prepared for:

US Department of Transportation
Research and Special Programs Administration
Volpe National Transportation Center
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Kendall Square
Cambridge, MA 02142

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July 2002

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APPENDICES

1.0 INTRODUCTION

This Health and Safety Plan (HSP) has been formulated to set forth the guidelines for safety and health issues and appropriate procedures to be followed during removal and restoration activities at various residential properties in Libby, MT. The work is being performed under Contract No. DTRS57–01–D–30006, Task Order No. T0005 and subsequent orders.

This plan covers work being performed by Kuo Environmental Services (KES) employees and subcontractors. While at the Libby Project site, KES employees and subcontractors will also follow the Libby Project Health and Safety Program prepared by CDM Federal Programs Corporation. In addition, Marcor Remediation, Inc., KES' removal subcontractor, will also follow their own Health and Safety Program.

1.1 KES Corporate Health and Safety Program

KES maintains a comprehensive Health and Safety Program consistent with the guidelines and requirements presented in the following documents. Kuo considers safety the highest priority during field activities involving potentially contaminated materials and has established a policy of minimizing exposure, which must be upheld on all projects. Project activities will be conducted in a manner that minimizes the possibility of injury, accident, or incident occurrence. KES employees, subcontractors, and visitors are required to read and sign the HSP before site entry.

OSHA Safety and Health Standards, 29 CFR 1910/1926, U. S. Department of Labor, Occupational Safety and Health Administration

OSHA Standard, 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response

Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/EPA/USCG, DHHS (NIOSH) Publication No. 85-115, 1985

US Army Corps of Engineers Safety and Health Requirements Manual, EM 385-1-1, September 1996

USACE, Appendix B, Safety and Occupational Health Document Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities, ER 385-1-92

American Conference of Governmental Industrial Hygienists (ACGIH), Threshold Limit Values and Biological Exposure Indices for 2001

CAL-OSHA, 8 CCR Chapter 4, Subchapter 7, General Safety Orders
CAL-OSHA, 8 CCR Chapter 4, Subchapter 4, Construction Safety Orders

Health and Safety Manual, KUO Environmental Inc., October 1999

Standard Operating Procedures (SOPs) in KES's Health and Safety Manual related to soil excavation activities are included in Appendix F for reference.

1.2 Background

W.R. Grace previously operated a vermiculite mine outside of the town of Libby, Montana. The mine is located on Zonolite Mountain approximately seven miles northeast of Libby. Vermiculite is used in various building materials and textiles. It is also used as a sub base and as a soil conditioner. According to historical records, 80 percent of the world's vermiculite came from the W.R. Grace Vermiculite Mine. The mine began operation in 1924 and was operated until 1990. When the mine was in operation, the ore was trucked to the mill. Processing at the mill included screening the ore into various sizes and running the ore through an expansion oven to increase the size of the vermiculite particles. The site also included a railroad loading facility where processed and unprocessed ore was loaded onto railcars for shipment and distribution. This site is also referred to as the "Screening Plant", "Railroad Loading Facility" and "Raintree Nursery". The Screening Plant site is located approximately 4.5 miles northeast of Libby on the northeast side of the Kootenai River.

The W.R. Grace vermiculite contains concentrations of tremolite. Tremolite is a rare and exceedingly toxic form of asbestos. During the six decades of operation of the mine and screening plant millions of tons of vermiculite was mined and shipped from Libby. It is also estimated that tons of asbestos was also released into the air causing possible contamination of various parts of the area, including portions of the town of Libby.

1.3 Site Location

The initial properties selected for remediation have been ranked in a residential removal priorities list. The following residences / properties are specified along with their removal types; soil, indoor dust, and Zonolite Attic Insulation (ZAI):

1. Hoff, Jeff	156 S. Central Road	Soil, indoor dust, ZAI
2. Spencer, Barbara	500 Jay Effar Road	Soil
3. Temple, Rod	319 Norman Ave.	Soil
4. Westfall, Don	781 Terrace View Ave.	Soil
5. Sanderson, Kevin and Cindy	123 Hamann Ave.	Soil, indoor dust, ZAI
6. Champion Haul Road	Off Highway 37	Soil

Site Map for the town of Libby can be found in Appendix A.

1.4 Scope of Work

Work under this task order consists of three key types of remediation efforts: Soil Removal, Interior Dust Removal, and Zonolite Attic Insulation (ZAI) Removal. Each property on the Residential Removals list has been identified as to the type of removal to be performed on that property.

A. Soil Removals

KES will review the property and survey plans and perform a site walk with a Volpe representative. Soil excavation activities will be performed on all contaminated areas. All contaminated soils will be disposed of properly as described in the Volpe Residential Removal Work Plans. There are six soil removals to be performed under Task Order No. 05. KES will restore the property in accordance with Section 4.0 of the Volpe Residential Removal Work Plans. Once soil remediation is completed, KES will restore the site to the conditions as set forth under the Task Order.

B. Interior Dust Removals

KES will remove all interior dust from the Hoff and Sanderson residences using wet wipes and HEPA vacuums. Air sampling will be performed by CDM to determine when the home interiors are considered clean.

C. Zonolite Attic Insulation (ZAI)

KES will remove all attic insulation from the Hoff and Sanderson residences including any asbestos-containing insulation that may be found in the walls. KES will replace all attic insulation with rolled-in fiberglass insulation. Insulation in the walls will be replaced by Icynene, an expanding foam insulation. KES will completely restore the walls and home to their initial conditions after remediation efforts.

1.5 Key Personnel and Organization

The project organization chart is presented in Appendix B. The safety and health designees and their general responsibilities are presented below. Field employees have OSHA 40-hour hazardous waste operations training, as well as required refreshers and any other additional training required by their job duties.

Project Manager

KES Project Manager, Mr. Mark Hallock, communicates directly with the US DOT representative and will serve as the primary point of contact. He is responsible for all site activities including:

- Ensuring that safety and health requirements are met.
- Briefing field team on specific duties.
- Controlling site access.
- Providing liaison with public officials.

Corporate Safety and Health Officer

As the Corporate Safety and Health Officer (SHO) and Certified Industrial Hygienist (CIH), Mr. Michael Ridosh is responsible for the development of this HSP in compliance with OSHA standards and KES safety and health policies. Additional responsibilities include:

- Modifying and/or developing new safety and health procedures as necessary.
- Ensuring all on-site personnel have been medically certified and trained in accordance with applicable OSHA standards in order to perform field activities.
- Reviewing medical surveillance procedures as outlined in KES's Safety and Health Plan.
- Being available for consulting during work activities and for emergencies.
- Reviewing accident reports, air monitoring reports, and daily inspection reports.
- Selecting respiratory protection, personal protective equipment (PPE), and levels of protection.
- Authorizing a stop-work order if he determines, in consultation with the Site Safety Officer (SSO), that a safety hazard or potentially dangerous situation exists.

Site Safety Officer

Mr. Ted Vandervert will be the Site Safety Officer (SSO) on this project. In his absence, Mr. Larry Pennock will be the SSO. The SSO implements and enforces the project safety program and procedures at the project site. The SSO has safety and health experience. The SSO will report directly to the SHO. On-site safety and health concerns will be the responsibility of the SSO. Specific responsibilities include:

- Selecting the proper level of PPE and respiratory protection in accordance with this HSP and ensuring its use by all onsite employees.
- Regularly inspecting all PPE and providing proper maintenance and storage of PPE.

- Monitoring on-site workers for signs of stress (e.g., heat stress, cold exposure, toxic exposure, and general fatigue).
- Participating in the preparation of the HSP and ensuring its implementation on site.
- Conducting daily safety meetings and inspections.
- Implementing evacuation procedures and coordinating emergency on-site medical care and services, when necessary.
- Keeping the project SHO appraised of any conditions not covered in this HSP.
- Issuing a stop-work order if site conditions change or if procedures are not being followed or appear inadequate.

Other Project Personnel

KES and subcontractor personnel who constitute the field team will have the following individual and collective responsibilities:

- Read and be thoroughly familiar with all aspects of the HSP.
- Complete all assigned tasks in compliance with the HSP.
- Notify the SHO of any potentially unsafe conditions.
- Attend all on-site safety meetings.

The field team will include at least two individuals with current CPR and First-Aid training.

2.0 POTENTIAL SAFETY AND HEALTH HAZARDS

This section presents the potential chemical, physical, biological, and task-specific hazards posed to site workers and the public during the field activities.

2.1 Public Safety and Health

The site activities pose minimal risk, if any, to the public and because the work is performed in a limited access area. Potential risks to public safety and health are limited to physical injury during site work and hauling of the materials. To avoid these risks, the project site will be partitioned off to prevent unauthorized access and warning signs will be posted. Designated trucking routes will be established and adhered to during hauling of materials to and from the work sites.

2.2 Worker Safety and Health

Potential hazards at the site include:

- Asbestos exposure;
- Physical hazards from lifting, tripping, equipment operations, falling, and excessive noise levels;

- Heat stress and exposure to cold;
- Biological hazards from animal bites, inset stings, and bird and rodent droppings.

This HSP describes KES's SOPs (Appendix F), potential hazards to safety and health, the measures to be taken by KES personnel and subcontractors to minimize those hazards, and procedures to be followed in the event of an emergency on site.

2.2.1 Chemical Hazards

The contaminate of concern for this project is asbestos. Asbestos is a generic term for a group of six naturally occurring, fibrous silicate minerals that have been widely used in commercial products. Asbestos minerals fall into two groups of classes: *serpentine* asbestos and amphibole asbestos.

Serpentine asbestos includes the mineral chrysotile, which is a magnesium silicate mineral. Serpentine asbestos possesses relatively long and flexible crystalline fibers that are capable of being woven.

Amphibole asbestos includes the minerals ammonite, crocidolite, tremolite, anthophyllite, and actinolite. Amphibole asbestos forms crystalline fibers that are substantially more brittle than serpentine asbestos.

The vermiculite mined from the Libby site contains concentrations of tremolite. Tremolite-actinolite asbestos is known to be present at the site.

Asbestos is of potential health concern because chronic inhalation exposure to excessive levels of asbestos fibers suspended in the air can result in lung disease such as asbestosis and lung cancer and mesothelioma. Asbestosis is a non-cancer type of disease that makes breathing progressively more difficult due to scarring of the lung tissue. Asbestosis can be fatal. Asbestos fibers can also cause lung cancer and mesothelioma. Mesothelioma is a rare cancer of the lining of the lungs and chest cavity. Mesothelioma is always fatal and almost always is associated with asbestos exposures. Asbestos has also been associated with increases in digestive cancers from accidental ingestion.

The primary concern is breathing airborne asbestos fibers. All site personnel will be protected from asbestos exposure through work practices. These work practices will include wetting techniques, covering trucks during hauling, bagging items for disposal, considering wind direction during work activities, air monitoring, and proper use of PPE.

2.2.2 Physical Hazards

Physical hazards are inherently present during field operations. The primary health risk for this project is associated with excavation, dust removal, and insulation removal

activities. Other physical hazards presented at the site will include the mechanical hazards and noise exposure associated with the operation of heavy equipment, and slip/trip/fall hazards associated with operations conducted in a field environment. Applicable SOPs are included in Appendix F. Typical physical hazards present on the site and methods to prevent injury due to these hazards are described below.

Heavy Equipment Operation

The worker can effectively eliminate safety hazards associated with the operation of heavy equipment if a constant awareness of these hazards is maintained. Constant visual or verbal contact with the equipment operator will facilitate such awareness.

Slip, Trip and Fall Hazards

While it is difficult to prevent slip/trip/fall hazards, risk of injury will be minimized by implementing proper site control measures such as daily safety meetings, proper footwear, and by keeping the work area free of obstructions and spilled fluids.

Lifting Hazards

Field operations often require that heavy physical labor tasks be performed. All employees will be instructed in proper lifting techniques. Additionally, employees will be instructed to not attempt to lift large or heavy objects without assistance.

Tool and Equipment Hazards

Safety hazards present during the use of tools and equipment are generally associated with improper tool handling and inadequate maintenance. Management of these hazards involves rigorous maintenance of tools and equipment and effective training of employees in the proper use of these tools.

Noise Levels

Whenever feasible, noise levels, identified as exceeding 85 decibels as a time weighted average over an 8-hour day, will be reduced by means of engineering controls. These controls will include isolation, enclosure, and application of noise reduction materials. Hearing protection shall be worn at all times when noise levels are suspected of being equal to or exceeding 85 decibels. Use of portable "walkman-type" radios is prohibited on the site. A copy of the OSHA Occupational Noise Standard, 29 CFR 1910.95, shall be available and copies shall be made available to employees upon request. KES maintains a hearing conservation program in accordance with 29 CFR Part 1910.95.

Weather

The weather is an important consideration in planning and conducting site operations. Rain and extremely hot or cold weather can cause physical discomfort, loss of efficiency, and personal injury. Of particular importance is heat stress, which often results when protective clothing decreases the body's natural ventilation process. The Cold Stress and Heat Stress prevention procedures are included in Appendix F.

All exterior site work will cease immediately and the site will be evacuated in the event of lightning, precipitation, or winds exceeding 40 miles per hour. All operations will cease immediately whenever an electrical storm is in progress or threatening in the immediate area.

2.2.3 Biological Hazards

The following biological hazards may be encountered on site although such encounters are not anticipated to pose a significant risk to site personnel:

- Animal bites and insect stings can cause localized swelling, itching, and minor pain that can be handled by first aid treatment. In sensitized individuals, however, effects can be more serious such as anaphylactic shock, which can lead to severe reactions in the circulatory, respiratory, and central nervous system, and in some cases, even death. The SSO will identify personnel with a known reaction to bites and stings at the pre-job safety orientation meeting. No attempts should be made to capture any wild or semi-wild animals such as cats or rats due to the possibility of a bite or parasitic infection.

- Exposure to animal droppings can cause infectious diseases such as hepatitis B and Hanta virus. The potential to inhale infectious airborne particulate must be minimized. If such droppings are present, workers may don PPE, wet the area to abate dusty conditions, or remove the material prior to starting the work.

2.3 Job Hazard Analysis

Job hazard analysis identifies the potential hazards posed by each major field activity, as well as the hazard control measures to be implemented to abate these potential hazards. Appendix G presents an activity hazard analysis for the anticipated site activities. Physical hazards are of primary concern during the field operations.

3.0 HAZARD CONTROL

Control of potential on-site hazards involves an understanding as well as application of the following topics: Training Requirements, Work Zones, General Work Practices, Personal Protective Equipment, Emergency Procedures, and Medical Monitoring. These topics are discussed below.

3.1 Training Requirements

Although all KES employees have basic training that includes a minimum of 40 hours of instruction in accordance with OSHA 29 CFR 1910.120, plus appropriate refresher training, the work activities for this project do not require such training.

Prior to the start of field operations, personnel will receive site-specific briefings. This will include asbestos awareness and scope of work. Personnel will also be required to verify that they have read and understand the HSP and Libby Health and Safety Program. Appendix C includes Acknowledgment, Site Entry Log, and Tailgate Safety Meeting forms.

3.2 Work Zones

In order to reduce the accidental spread of hazardous substances by workers from contaminated areas to clean areas, the HSO will configure the work site into zones. The work area will be divided into three well-delineated zones:

- Exclusion Zone (EZ)
- Contamination Reduction Zone (CRZ)
- Support / Clean Zone (SZ)

Exclusion Zone

The EZ is the area of the site where potential exposure of personnel and equipment is likely to occur. The outer boundary of the EZ will be established by placement of barriers and will be designated by appropriate signs. Access control points will be established to regulate the flow of personnel and equipment into and out of the EZ. Visitors will not be permitted to enter the EZ without the authorization of the SHO and documentation of appropriate and current training.

Contamination Reduction Zone

The CRZ is a transition zone between the EZ and the SZ and is designed to reduce the probability that contamination will be transmitted to the clean SZ. Decontamination is performed within this zone. Decontamination procedures are outlined below. Visitors will not be permitted to enter the CRZ unless authorized by the SHO.

Support Zone

The SZ will be located in a clean, uncontaminated area outside the CRZ. The SZ provides storage areas for clean safety and work equipment and facilities for support activities. No contaminated equipment, samples, or personnel are permitted in the SZ.

The zones will be delineated using caution tape, barricades, and temporary fencing. Personnel will access the Exclusion Zone only through designated locations in the Contamination Reduction Zone.

3.3 General Work Practices and Accident Prevention

Maintenance of site control measures, enforcement of safe work practices, and establishment of a spill containment program are essential components of accident prevention at a work site. The following is a listing of general work practices that must be complied with to ensure the greatest degree of safety and accident prevention:

- All personnel working at the site and all visitors to the site are required to read this HSP and to sign the Acknowledgment of Understanding before they may enter the work area. In addition, any person working at the site or visiting the site must sign the Site Entry Log daily.
- Protective clothing and equipment will be worn at the work site at the protective level specified by the SHO or SSO.
- All personnel must use the buddy system at all times while working on site. Under no circumstances shall employees work alone on site.
- Equipment will be kept in proper working order, free of accumulated lubricants, contaminants, or other hazardous or flammable substances.
- No containers of fuels or other flammables will be kept within 100 feet of any excavation and loading operations.
- Daily safety briefings will be held by the SSO.
- All employees will follow policies promulgated in this HSP. Changes in any procedures or policies contained in this plan will only be implemented after approval from the project SHO.

3.4 Personal Protective Equipment

The hazards anticipated to be present during the described property decontamination and soil excavation, loading and hauling activities will probably require low to moderate level protection. Field personnel will don Level C and D protection PPE during on-site work activities. As conditions warrant, protection levels may be upgraded or modified. The SSO in conjunction with the SHO will determine the appropriate personal protection level. Based upon current knowledge Level A and B protection will not be required for the operations in this Task Order. Level C will be worn during property

decontamination, contaminated soil excavation, and disposal loading. Level D and modified Level D will be worn during all other activities.

The equipment necessary for Level D is detailed below.

LEVEL D - Level D consists of the basic work uniform, which includes:

- Hard hat
- Orange vest
- Safety glasses
- Steel-toed boots
- Hearing protection
- Cloth and/or leather gloves for equipment operators
- An immediately available half-face respirator with HEPA cartridges

LEVEL C – Level C consists of the following protective equipment:

- Hard hat
- Orange vest
- Safety glasses
- Hearing protection
- Half-face respirator with HEPA cartridges
- Tyvek coveralls
- Steel-toed rubber boots
- Nitrile or latex gloves

3.5 Decontamination Procedures

There will be two types of decontamination facilities: personnel and equipment. A portable personnel decontamination / changing station will be constructed at each removal site. Personnel will enter and exit the work area through this station. They will also use this station to don and remove PPE. Decon water will be collected, filtered, and properly disposed of.

Equipment decon stations will be constructed and maintained as needed. A permanent equipment decon station will be maintained at the mine road for use during off-hauling activities. Trucks and equipment will drive onto the equipment decon station. Truck tires and equipment will be washed down to remove any dirt or asbestos contamination before the truck or equipment leaves the site. Decon water will be collected, filtered, and disposed of properly.

3.6 Emergency Procedures

Situations that could occur requiring an emergency response action are listed below:

- A spill of fuels and/or lubricants during equipment operations.
- An n equipment related or personal injury accident.

A list of emergency response agencies and their telephone numbers and Route to the Hospital Map are included in Appendices D and E. Both will be posted at the project site. Routine emergency procedures include:

Escape Routes

In the event of an emergency, all personnel will evacuate the site and meet at a predetermined agreed upon location. Once the actual borrow site location is selected, the SSO will determine the emergency meeting location. The SSO or Site Supervisor will use the Site Entry Log to ensure that all personnel have evacuated the site.

Evacuation Signals and Other Signals

Due to the small work areas anticipated during this project, creation of evacuation and other signals will not be necessary. Nevertheless, workers should be cognizant of the reduction of communication abilities in high noise areas. In the event of withdrawal from the working area, verbal notification and three blasts from an air horn will be given. A handheld radio will be at each work site. A cellular telephone will be used at any site that does not have adequate radio reception.

First Aid

A first aid kit will be located at each work site and in all KES vehicles. The SSO and another person will be certified by the American Red Cross in first aid and CPR. If an injured individual requires further attention, the individual will be immediately transported to the nearest hospital. A map illustrating the route to the nearest emergency medical facility will be present on site (see Appendix E). All accidents without regard to the severity shall be reported in writing to KES's SHO within 24 hours. All accidents requiring a physician's treatment shall be reported immediately to the SHO.

3.7 Medical Monitoring

All KES and subcontractor personnel who will be entering Level C exclusion zone area will have completed an annual physical examination that meets the requirements of 29 CFR 1910.120 (F) and Title 8 CCR 1512. Copies of the Physician's Written Opinion

certifying that individual is authorized to perform the work will be kept at the local KES office and will be available upon request.

The physical examination consists of the following, at a minimum:

- Medical and occupational history.
- Physical examination, with particular emphasis on the cardiopulmonary system, general physical fitness, skin, blood-forming system, renal and nervous systems.
- Urinalysis.
- Blood analysis.
- Additional tests as appropriate, including chest X-ray electrocardiogram stress test, pulmonary function test.

Based on this examination, the physician will certify whether the individual is capable of full participation in the program, or whether this person must work within certain restrictions.

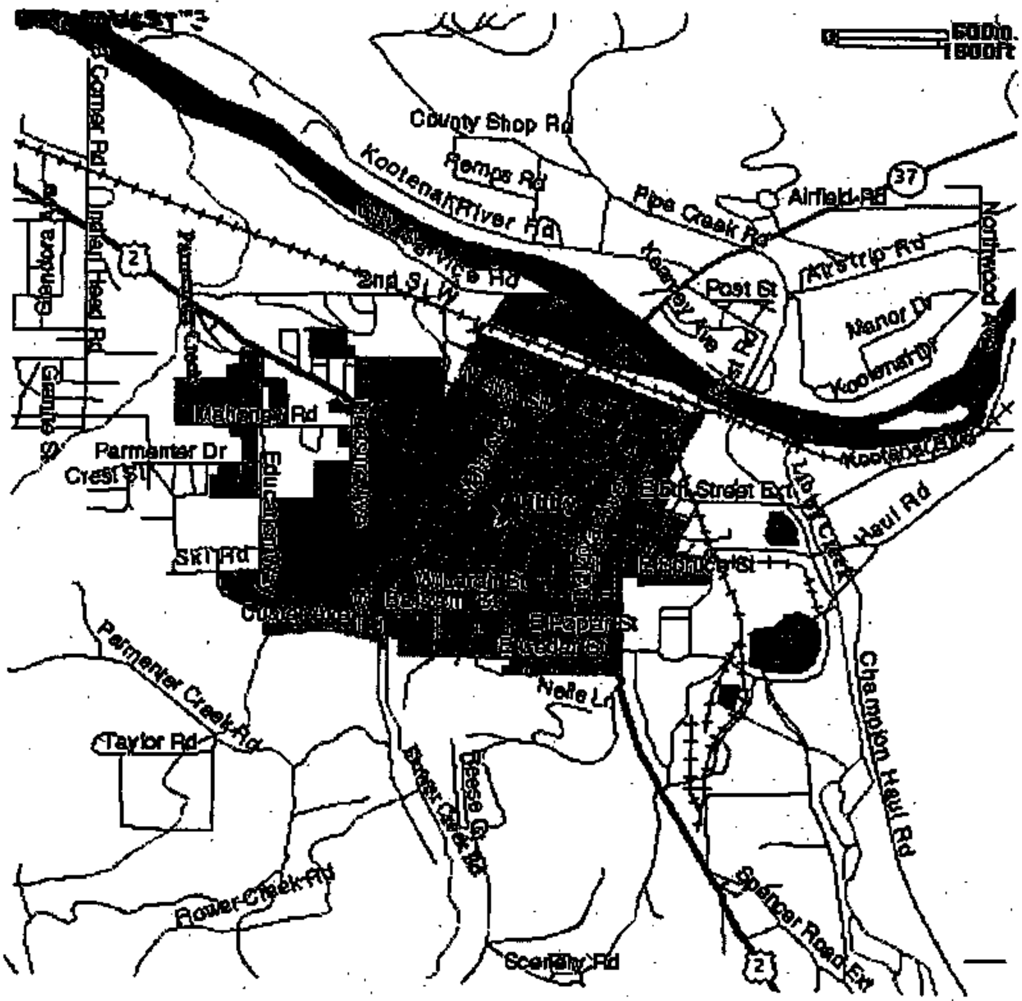
All medical records are held by KES for a period of at least 30 years after the employee's termination of employment, in accordance with OSHA regulations on confidentiality and record keeping.

In addition to the annual physical examination, on-site medical surveillance is standard KES procedure and includes heat stress and cold stress monitoring and prevention, contaminant monitoring, and hearing conservation measures.

APPENDIX A

Site Map

Libby, MT
US



County Shop Rd
Remps Rd
Kootenai River Rd
Pipe Creek Rd
Airfield Rd
37
Airstrip Rd
Northwood
2nd St W
Post St
Manor Dr
Kootenai Dr
Gomer Rd
Indian Head Rd
Glendora
2
Mahoney Rd
Parmenter Dr
Crest St
Ski Rd
Educational Way
Haul Rd
Lincoln St
Champion Haul Rd
Parmenter Creek Rd
Taylor Rd
Nelle Ln
Flower Creek Rd
Scenery Rd
Spencer Road Ext

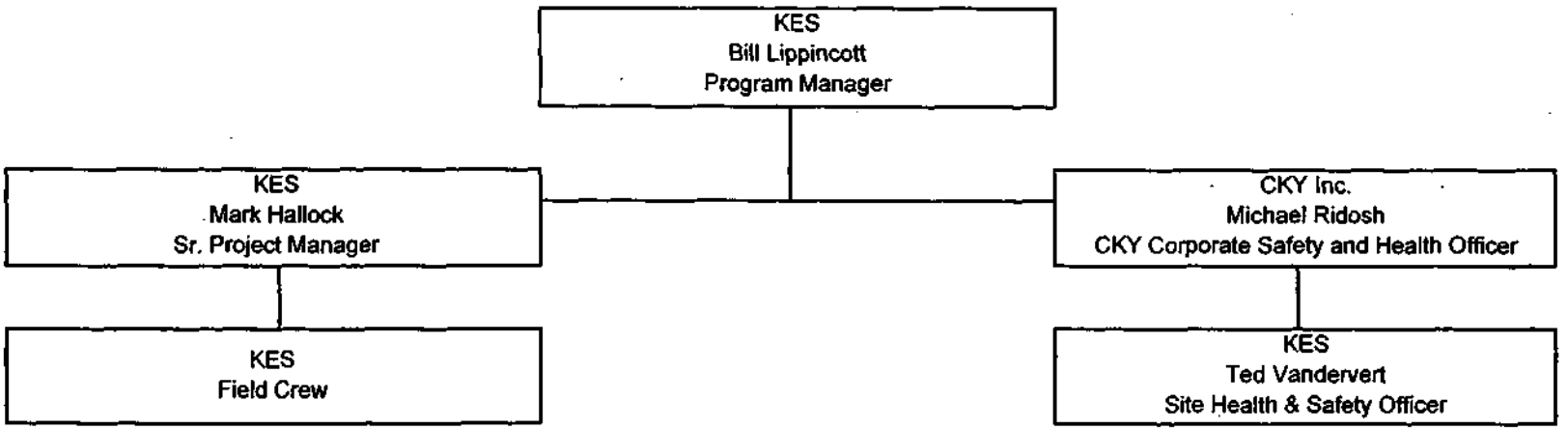
APPENDIX B

Organization Chart

SAFETY ORGANIZATIONAL CHART

Libby Asbestos Project
Libby, MT

Contract No. DTRS57-01-D-30006
Task Order No. T0005



APPENDIX C

FORMS:
AKNOWLEDGMENT, SITE ENTRY LOG, AND TAILGATE SAFETY MEETING

SITE-SPECIFIC SAFETY AND HEALTH PLAN ACKNOWLEDGMENT

I have read, understand, and agree to abide by the provisions as detailed in the Site-specific Safety and Health Plan (Libby Asbestos Project, Libby, MT, Contract No. DTRS57-01-D-30006, Task Order No. T0005) dated July 2002 by KES. Failure to comply with these provisions may lead to disciplinary action and/or dismissal from the work site.

Print Name	Company	Signature	Date

SITE ENTRY LOG

Libby Asbestos Project
Libby, MT
Contract No. DTRS57-01-D-30006, Task Order No. T0005

Location: _____

Date: _____

Print Name	Sign	Date	Time in:	Time out

Site Safety Officer: _____ Date: _____

TAILGATE SAFETY MEETING

Libby Asbestos Project
Libby, MT
Contract No. DTRS57-01-D-30006, Task Order No. T0005

Location: _____

Date: _____

Accident since last meeting: _____

Hazards discussed today:

_____

_____

_____

Main topic of discussion:

_____

_____

_____

_____

Personnel in attendance (please print name):

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

_____ _____

Comments: _____

_____

_____

_____

Site Safety Officer: _____

APPENDIX D

EMERGENCY TELEPHONE NUMBERS

EMERGENCY TELEPHONE NUMBERS

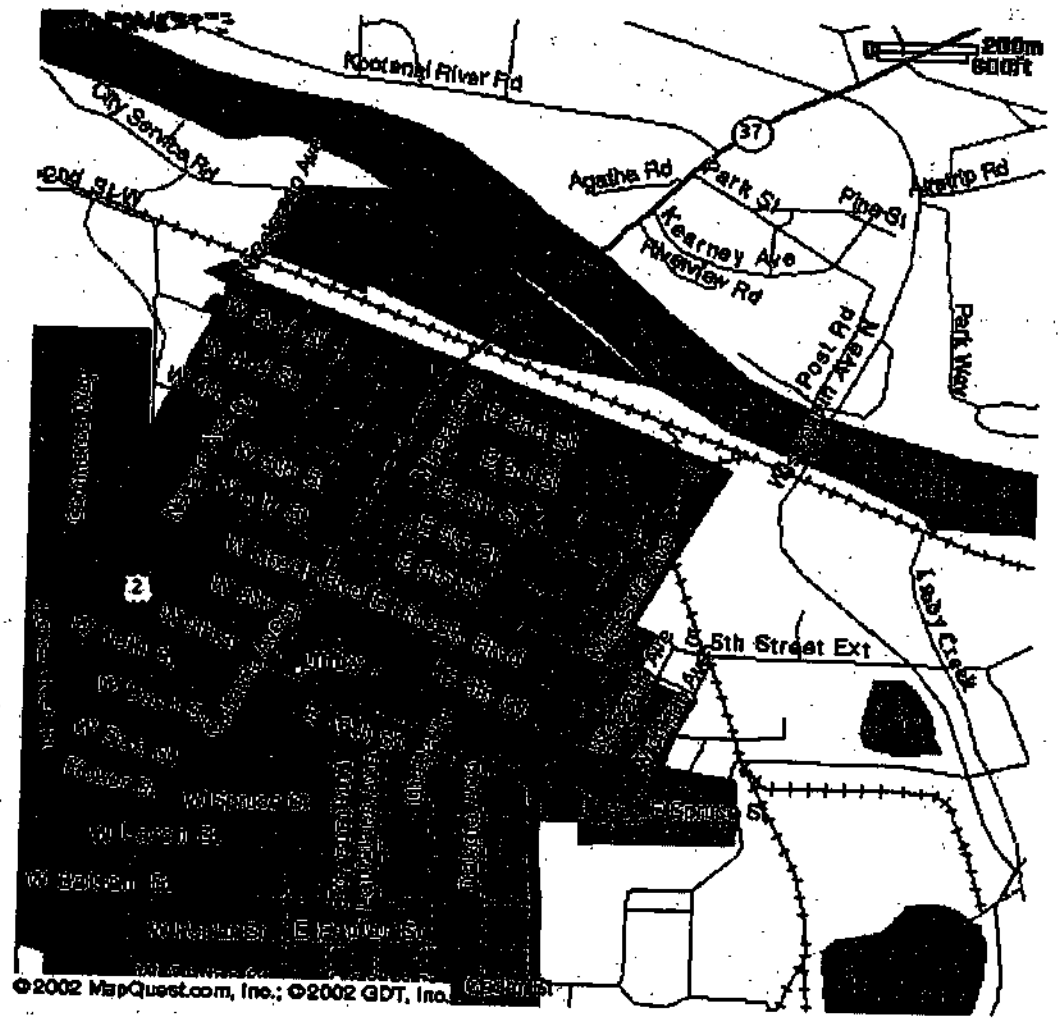
Contract No. DTRS57-01-D-30006
Task Order No. T0005
Libby Asbestos Project
Libby, Montana

Police	911
Fire Department	911
Hospital: St. John's Lutheran Hospital 350 Louisiana Ave Libby, MT 59923 406-293-7761 FAX 406-293-7931	
Poison Center	800-532-2222
National Response Center	800-424-8802
US Environmental Protection Agency Info Center	406-293-6194
KES Corporate Office (Bill Lippincott)	619-743-3938
KES Elk Grove Office (Mark Hallock)	916-714-3212
Cell	916-804-9954
KES Libby (Mark Hallock)	406-293-4160
FAX	406-293-6939
Health and Safety Officer (Michael Ridosh)	818-888-5894

APPENDIX E

HOSPITAL MAP

350 Louisiana Ave
Libby, MT
59923-2130, US



St. John's Lutheran Hospital
350 Louisiana Ave
Libby, MT 59923
406-293-7761
FAX 406-293-7931

APPENDIX F

STANDARD OPERATING PROCEDURES

These Standard Operation Procedures *are drawn from CKY Incorporated's* Injury and Illness Prevention Plan *under the auspices of the CKY-KUO Environmental Mentor Protégé Agreement*

OPERATING PROCEDURE NO. HS-101

PERSONNEL MEDICAL AND EXPOSURE RECORDS

101.1 PURPOSE

To provide the medical personnel with an employee health profile. This system of recording medical information and exposure potential is known as the Employee Medical Surveillance Program (EMSP). EMSP records will be collected and retained in accordance with 29 CFR 1910.120.

101.2 PROJECT INFORMATION

The site safety and health plan will provide sources of information for EMSP relative to potential chemical exposures and level of personal protection. Information will also be provided to physicians via the history form required for each medical examination.

101.3 INPUTS FOR EMSP

Medical surveillance records provide a clinical base of information useful in evaluating employee's fitness to work at hazardous waste sites, identifying anomalies in a person's medical history that may be related to potential impaired health, evaluating a person's capability to use respiratory protection equipment, and identifying illnesses that may be related to chemical exposure while on the job. The clinical base of medical information includes personnel health history, exposure history, physical examination results, laboratory analyses, and results of screening and special tests.

Time sheet information will be incorporated into EMSP for estimating hours of exposure to potential hazardous materials during field activities. Employees filling out time sheets will indicate hazardous material field work on a project by using the Code 120 under work code section.

Dr. David Stern and Dr. Gary Hathaway of Western Medical Group, CKY Medical Officers, will maintain the medical surveillance records for the duration of each employee's employment plus 30 years thereafter.

101.4 MEDICAL EXAMINATIONS

INITIAL BASELINE EXAMINATION: The purpose of the baseline examination is pre-assignment screening. All applicable employees will be given a baseline examination before being assigned to work at sites containing potentially hazardous substances. The baseline examination consists of the following:

- Physical examination
  - Complete health history
  - Vision test - near/far/color
  - Complete urinalysis
  - Blood pressure/pulse/respiration
  - Ear, nose, throat
  - Heart/lung/abdomen
  - Back examination
  - Height/weight
  - Hernia check
  - Joints exam
- Chest X-rays
- Complete blood count
- Blood chemistry
- Electrocardiogram
- Hearing test
- Pulmonary function test

ROUTINE EXAMINATION: All personnel who have taken the initial baseline examination and have received clearance by the examining and/or reviewing physician to participate in field or laboratory activities will be re-examined on an annual or biennial basis. Generally, employees with less than 100 hours of annual hazardous waste field work will have biennial examinations. Employees with greater than 100 hours hazardous waste field work will have annual examination. The reviewing physician will have final authority in regard to examination frequency.

EXIT EXAMINATION: An exit examination will be given to any employee whose employment with CKY has included hazardous materials work and who has been a participant in medical surveillance. The exit examination may be waived if the most recent examination was in the past six months.

SPECIAL TESTING: Special testing may be required on certain projects due to the potential for exposure to specific substances. This may also be necessary where the potential for heat or cold stress exists. The need for special testing will be assessed on a project-by-project basis. Examples of special testing conditions include sites containing asbestos, arsenic, or lead where specific OSHA medical requirements for these compounds are in effect.

101.5 ADDITIONAL EMSP INPUTS

Respirator fit testing results, health and safety training attendance, and incident reports will be recorded and be input to the EMSP system by the Corporate Health and Safety Officer (CHSO).

101.6 OUTPUTS FOR EMSP

EMSP information on employee medical examinations will be confidential and available only to the examining and reviewing physicians. The computerized examination information will be used by the reviewing physician to look at groups of employees (e.g., employees who worked on a specific hazardous waste site). The system will also be used to detect year-to-year changes in employee health parameters. Potential chemical exposure site time, respirator fit testing, health and safety training, and incident information will be available. Typical EMSP outputs include:

- Employee qualification status by operating unit.
- Medical scheduling report.
- Hazardous waste field hours by employee.
- Overdue training/medical by operating unit.

101.7 REFERENCES

OSHA Safety and Health Standards for General Industry, Hazardous Waste Operations and Emergency Response (29 CFR Part 1910.120), U.S. Department of Labor, Occupational Safety and Health Administration.

OPERATING PROCEDURE NO. HS-102

HEAT STRESS

102.1 PURPOSE

To provide general information on heat stress and methods to prevent or minimize the occurrence of heat stress.

Adverse climatic conditions are important considerations in planning and conducting site operations. Ambient temperature effects can include physical discomfort, reduced efficiency, personal injury, and increased accident probability. Heat stress is a particular concern when wearing impermeable protective garments, since these garments inhibit evaporative body cooling.

102.2 REQUIREMENTS

The NIOSH criteria document for heat stress recommends that environmental monitoring and other preventive measures be adopted in hot work environments. The provisions are not directly applicable to employees who are required to wear impermeable protective clothing. The reason for this exception is impermeable clothing prevents the evaporation of sweat, which is one of the most important cooling mechanisms of the body. There is no recognized health standard protection for workers wearing impermeable protective clothing and respirators in hot environments.

The ACGIH has adopted a TLV for heat stress. These guides relate to work/rest regimes.

102.3 ADDITIONAL HAZARD

The use of Personal Protective Equipment (PPE) commonly recommended for hazardous waste work can place stress on the body. One common problem with the use of PPE, especially in hot environments, is heat stress. Protective clothing can cause excessive sweating and can prevent the body from properly regulating body temperature.

102.4 TYPES OF HEAT STRESS

Heat stress is the aggregate of environmental and physical work factors that constitute the total heat load imposed on the body. The environmental factors of heat stress are the air temperature, radiant heat exchange, air movement, and water vapor pressure. Physical work contributes to the total heat stress of the job by producing metabolic heat in the body in proportion to the intensity of the work. The amount and type of clothing also affect the heat stress.

Heat strain is the series of physiological responses to heat stress. When the strain is excessive for the exposed individual, a feeling of discomfort or distress may result, and, finally, a heat disorder may ensue. The severity of strain will depend not only on the magnitude of the prevailing stress, but also on the age, physical fitness, degree of acclimatization, and dehydration of the worker.

Heat disorder is a general term used to describe one or more of the following heat-related disabilities or illnesses:

- Heat Cramps - painful intermittent spasms of the voluntary muscles following hard physical work in a hot environment. Cramps usually occur after heavy sweating, and often begin at the end of a work shift.

- Heat Exhaustion - profuse sweating, weakness, rapid pulse, dizziness, nausea, and headache. The skin is cool and sometimes pale and clammy with sweat. Body temperature is normal or subnormal. Nausea, vomiting, and unconsciousness may occur.

- Heat Stroke - sweating is diminished or absent. The skin is hot, dry, and flushed. Increased body temperature, which, if uncontrolled, may lead to delirium, convulsions, coma, and even death. Medical care is urgently needed.

102.5 METHODS OF CONTROLLING HEAT STRESS

The following control measures are appropriate to aid in controlling heat stress:

- Provide for adequate liquids to replace lost body fluids and replace water and salt lost from sweating. Encourage personnel to drink more liquid than the amount required to satisfy thirst. Thirst satisfaction is not an accurate indicator of adequate salt and fluid replacement.

- Replace fluids with water, commercial mixes such as Gatorade or Quick Kick, or a combination of these.

- Establish a work regimen that will provide adequate rest periods for cooling down. This may require additional shifts of workers.

- Wear cooling devices such as vortex tubes or cooling vests beneath protective garments.

- Take all breaks in a cool rest area (77°F is best)

- Remove impermeable protective garments during rest periods.

- Do not assign other tasks to personnel during rest periods.

- Inform personnel of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress

102.6 MONITORING

102.6.1 Temperature

The degree of heat stress can be monitored by the Wet Bulb Globe Temperature Index (WBGT) technique. Where heat stress is a possibility, a heat stress monitoring device, such as the Wibget Heat Stress Monitor (Reuter Stokes) can be utilized.

The WBGT will be compared to the Threshold Limit Values (TLV) outlined by the ACGIH TLV guides, and a work-rest regiment can be established in accordance with the WBGT. Note that 5°C must be subtracted from the TLVs for heat stress listed to compensate for the impermeable protective clothing.

102.6.2 Medical

In addition to the provisions of the CKY medical surveillance program, on-site medical monitoring of personnel should be performed by qualified medical personnel for projects where heat stress is a major concern. Blood pressure, pulse, body temperature (oral), and body weight loss should be taken and recorded by SHSO.

- Heart Rate - Count the radial pulse during a 30-second period as early as possible in the rest period. If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third. If the heart rate still exceeds 110 beats per minute at the next rest cycle, shorten the following work cycle by one-third.

- Oral Temperature - Use a clinical thermometer or similar device to measure the oral temperature at the end of the work period (before drinking liquids). If the oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period. If the oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following work cycle by one-third.

- Do not permit a worker to wear a semi-permeable or impermeable garment if his/her oral temperature exceeds 100.6°F (38.1°C).

- Body Weight Loss - Measure body weight on a scale accurate to +0.25 pounds at the beginning and end of each work day (also lunch break, if possible) to see if enough fluids are being taken to prevent dehydration. Weights should be taken while the

employee wears similar clothing or, ideally, nude. The body water loss should not exceed 1.5 percent total body weight loss in a work day.

- Portable water and Gatorade or other electrolyte replacement fluid should be available. Workers should be encouraged to drink fluids during rest periods.

- Physiological Monitoring - Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work. The length of the work cycle will be governed by the frequency of the required physiological monitoring.

102.7 EMERGENCY ACTIONS

The body temperature must be lowered immediately in any heat stress cases. Evacuate the person to a shady or cool area in the contamination reduction zone. Remove all protective outerwear and personal clothing. Apply cold wet towels, ice bags, etc. to the person's head. Sponge off bare skin with cool water or rubbing alcohol, if available, or even place the victim in a tub of cool water. The main objective is to cool the person without chilling them. Give no stimulants. Transport the person to a medical facility as soon as possible.

102.8 REFERENCES

American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances in the Work Environment, 1984-1988.

National Institute for Occupational Safety and Health, The Industrial Environment, Its Evaluation and Control, 1973.

Olishifski, J.B., Fundamentals of Industrial Hygiene, National Safety Council, 1983.

OPERATING PROCEDURE NO. HS-104

HEARING CONSERVATION

104.1 PURPOSE

CKY has the responsibility to provide a safe and healthful environment in which employees work. To fulfill this responsibility with respect to hazardous noise, a comprehensive hearing conservation program has been established. The elements necessary to satisfy the criteria for an effective hearing conservation program include education and training of employees, a general noise survey with monitoring of employee noise exposures, engineering and/or administrative controls, a hearing protection program, and annual audiometric evaluation .

104.2 GENERAL

Hearing loss may be the result of one or more factors including aging, disease, injury or prolonged exposure to loud noise. The hearing loss due to exposure to excessive noise is the result of nerve cell damage in the inner ear.

Noise has long been recognized as a cause of occupational loss of hearing. Hearing loss can be either temporary or permanent. The hearing loss first experienced after being exposed to loud noise is called a temporary threshold shift if the ear is able to recover after a quiet period of a few minutes, hours or days. However, if exposure to loud noise is severe enough or continues day after day, the temporary shift in hearing ability can and will probably become permanent. Regardless of recovery time, a permanent hearing loss cannot be repaired.

104.3 EMPLOYEE MONITORING

Employee exposure to noise will be monitored periodically to determine their 8-hour time-weighted average (TWA) exposure to noise. Annual audiometric tests will be given to all employees with a TWA equal to or greater than 85 decibel (dBA). Hearing protection is required and worn by all employees whenever the following conditions exist:

- A worker is exposed to noise levels of 85 dBA or more, regardless of the time spent in that area.
- A job activity that requires exposure to suspected elevated noise levels which have not been measured, and the job is not a recurring one (e.g., temporary construction or maintenance projects using air hammers, air wrenches, explosive guns, generator, etc.)

In some cases, only a few people will be selected for monitoring when their jobs are representative of those for a group of employees. After initial determination of employee's 8-hour TWA noise exposure, it is required that these monitoring procedures be repeated for all job classifications periodically on a continuing basis. Noise monitoring may be discontinued if the initial determinations or actual exposure measurements indicate that employees' TWA noise exposures are less than 85 dBA.

All employees exposed to an 8-hour TWA of 85 dBA or greater must be notified of their noise exposure.

104.4 AUDIOMETRIC TESTING

Audiometric testing (hearing test) is required annually for employees exposed to noise with an 8-hour TWA of 85 dBA or greater. Baseline or initial audiograms is required for new employees within six months of their initial exposure to noise at or above an 8-hour TWA of 85 dBA. Audiometric testing will be conducted by Western Medical Group in Torrance, California.

104.5 CONTROL MEASURES

Administrative and engineering control measures will be made to reduce the noise exposure to employees. If this is not feasible or practical, hearing protection equipment will be worn for exposure to 85 dBA or greater.

104.6 PROTECTIVE EQUIPMENT

Hearing protectors (plugs, muffs) will be provided for everyone exposed to noise levels of 85 dBA or greater. The protectors provided must be effective in reducing noise to safe levels when properly worn.

104.7 TRAINING PROGRAM

All employees with a TWA of 85 dBa or greater must be included in a training program which includes information on: the effects of noise on hearing, control measures, hearing protectors, audiometric tests, and requirements of OSHA Noise Standard. This training program must be repeated annually for affected employees.

104.8 RECORD KEEPING

Records will be kept of employee noise measurements, audiometric testing and audiometer calibration. The requirements for record keeping, record retention and employee access to records as outlined in OSHA Noise Standard 1910.95 and CCR, Title 8, Section 5095 will be followed.

OPERATING PROCEDURE NO. HS-106

ACCIDENT PREVENTION PROGRAM

106.1 PURPOSE

To establish basic guidelines and health and safety practices for the completion of work involving potential physical and chemical hazards. Additional information regarding CKY's health and safety policies and procedures can be found in the Corporate Health and Safety Plan and the Operating Procedures.

106.2 ADMINISTRATIVE RESPONSIBILITIES

The Project Manager will have primary responsibility for implementing safety procedures. The Site Safety and Health Officer will have primary responsibility for enforcement of safety provisions as outlined in the Safety and Health Plan (SHP) including daily safety and health inspections. The Quality Control (QC) Inspector is responsible for equipment safety (other than safety and health equipment). Administrative responsibilities are specified in Section 2.5 of CKY's Corporate Health and Safety Plan.

106.3 SUBCONTRACTORS

Subcontractors are required to adhere to all policies and procedures in effect for a specific project, including the Safety and Health Program, the Site Specific Safety and Health Plan, the Accident Prevention Plan, all training requirements, etc. Subcontractor equipment and materials will be required to submit to all required inspections and testing.

106.4 TRAINING

All CKY employees and subcontractors at this site have had 40-Hour Hazardous Waste Operations Training and three days of actual field experience in compliance with 29 CFR 1910.120. Eight-hour refresher training has been provided to all employees in the past 12 months who have had the 40-hour training. Onsite managers and supervisors have received an additional eight hours of specialized training. Copies of course materials, attendance records and certification of completion for each employee are available for inspection, if requested .

106.5 TAILGATE MEETINGS

Daily site employee safety meetings will be held and documented onsite. Each day prior to commencing work, a safety meeting will be held to discuss safety considerations for

the day and work to be done. A safety topic will be addressed each day from the following list:

- Site-Specific Safety and Health Plan (first day and once a week thereafter)
- Site Emergency Procedures
- Fire Fighting Techniques
- Decontamination
- Levels of Protection
- Heat Stress
- Emergency Equipment on Site
- Respirator Maintenance
- Self-Contained Breathing Apparatus (if necessary)
- Back Care

Daily safety tailgate meetings will be documented in writing along with the daily QC reports.

106.6 INSPECTION

All job sites will be inspected daily by a QC Inspector. Inspections will be performed and recorded on the attached *Safety Inspection Check List For Construction Equipment* form.

106.7 ACCIDENT REPORTS

A report will be submitted to the Health and Safety Officer within 24 hours of each incident involving medical treatment. The Health and Safety Officer will distribute copies of the report to the Corporate Health and Safety Officer (CHSO). When an injury or illness is reported, the CHSO will deliver a copy of the report to the individual in charge of personnel affairs so that a Worker's Compensation Insurance Report can be filed if necessary. Reports will be received by personnel within 48 hours of each qualifying incident.

OPERATING PROCEDURE NO. HS-201

SELECTION AND USE OF RESPIRATORY PROTECTION EQUIPMENT

201.1 PURPOSE

To provide information for the proper selection of respiratory protection equipment. It is to ensure that respirators are properly selected and used in accordance with OSHA requirements. Respirators must be selected on the basis of the hazards to which personnel are or may potentially be exposed.

201.2 REQUIREMENTS

The OSHA standards found in Title 29 of the Code of Federal Regulations (CFR), Section 1910.134 establishes requirements for respiratory protection programs, as summarized in the following twelve major points:

- Establish Written Operating Procedures - A formal written document outlining aspects of the respiratory protection program must be developed.

- Respirator Selection - Proper selection of respirators will be made according to the guidance of ANSI Z88.2, 1980. In choosing respirators, consider the nature and extent of the hazard, the work requirements and conditions, and the characteristics and limitations of the respirators available. When examining the hazardous environment, the questions that should be asked are:

  - What are the contaminants?
  - What are their concentrations?
  - Are they gaseous or particulate?
  - Do they have adequate warning properties?
  - Are concentrations immediately dangerous to life or health?
  - Does the air contain at least 19.5 percent oxygen?
  - Are protective clothing and hand protection necessary?

- Training - Users of respirators should be trained in how to select, use, clean, maintain, and store their respirators. Such training will provide the respirator user with an opportunity to handle the respirator, have it properly fitted, test its facepiece-to-face seal, wear it in normal air for a long familiarity period, and finally, wear it in a test atmosphere. Every respirator wearer will receive fitting instructions, including demonstrations and practice in how to determine if it fits properly.

- Assign Individual Respirators Where Practical - When respirators are assigned individually, there is less chance that a worker will use one that does not give him or

her the best protection. Sometimes it overcomes the unwillingness of an employee to wear a respirator if he or she thinks someone else has used it, and that it was not properly sanitized afterward.

- Regularly Clean and Sanitize Respirators - There is a three-step method of washing the respirator in a detergent or cleaner-sanitizer, rinsing it in warm water, and air drying it.

- Respirator Storage - Storing respirators in clean plastic bags or other suitable containers in a clean and sanitary location maintains the integrity of the cleaning and maintenance program.

- Respirator Inspection and Maintenance - Inspection and maintenance of respirators in accordance with the manufacturer's instructions will ensure that the respirators, when properly used, will give the wearer the best possible protection.

- Monitor the Work Area - Make sure the right respirator is being used. If there is a change in materials, or processes, in the work area that change the concentration of contaminants, or creates completely different contaminants, changes must be made in the respirator program.

- Continually Enforce and Evaluate the Respirator Program - No matter how well the written SOPs are drawn up, the program cannot be effective if it is not enforced. Frequent random inspections will be conducted by a qualified individual to assure that respirators are properly selected, used, cleaned, and maintained. If defects are found, corrective action should be taken.

- Medical Evaluation of Respirator Wearers - If a potential respirator wearer is not physically able to perform the work using of a respirator, the use of a respirator may create more problems than it solves. A physician should be consulted to make sure each respirator wearer is physically qualified.

- Use Approved or Accepted Respirators - The respirators used in the work environment must be NIOSH/MSHA certified, where applicable, or be otherwise accepted to provide adequate protection for the hazards encountered.

- Air quality - Compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration will be of high purity. Oxygen must meet the requirements of the United States Pharmacopoeia for medical or breathing oxygen. Breathing air must meet at least the requirements of the specification for Grade D breathing air as described in Compressed Gas Association Commodity Specification G-7.1-1966 as required by 29 CFR 1910.134. Compressed oxygen should not be used in supplied-air respirators or in open circuit self-contained breathing apparatus that have

previously used compressed air. Oxygen must never be used with air line respirators.

201.3 SELECTION

The type of respirators will be selected based on the following considerations:

- What is the estimated contaminant concentration in the work area where the respirator will be used, as determined by industrial hygiene monitoring information.

- What is the permissible exposure limit (PEL) to the contaminant, threshold limit value (TLV), and short-term exposure limit (STEL)? Health standards for many specific substances are available. Good industrial hygiene practice should base respirator selection on current TLV's or other new toxicity data.

- Is the contaminant a gas, vapor, mist, dust or fume? This information can be determined by studying the manufacturing or maintenance process raw materials, intermediate products, by-products and the wastes. See Material Safety Data Sheets (MSDS) when available.

- Could the contaminant concentrations be termed immediately dangerous to life or health (IDLH)? This knowledge is derived from the manufacturer of raw materials, the knowledge of process engineer or chemist, the company or plant industrial hygienist, and MSDS, when available. In addition, consideration should be given to the potential for contamination of atmospheres under abnormal or emergency conditions.

- If the contaminant is flammable, does the estimated concentration approach the lower explosive limit (LEL), or do dust concentrations create a potential explosion problem? Besides creating a potential fire and explosion condition, in most situations flammable vapor or gas concentrations exceeding the LEL are IDLH. Plant gas or vapor levels can be determined with an explosion or combustible gas indicator (CGI). Here, too, emergency (such as spill) conditions should be considered.

- Does the contaminant have adequate warning properties? Manufacturers can supply such information, directly or through MSDS. Warning properties such as odor, irritation or taste should ideally be present at concentrations at or below the PEL.

- Will the contaminant irritate the eyes at the estimated concentration? Frequently, this will be self-evident if the operation is in progress. This information, too, is available from the MSDS of raw materials. For irritant materials, a full facepiece respirator should be employed.

- If the contaminant is a gas or vapor, is there any available sorbet that traps it efficiently? Respirator manufacturers and/or industrial hygienists can provide this information.

- Can the contaminant be absorbed through the skin as a vapor or liquid? If so, will it significantly add to the employee's exposure and cause injury? MSDS will indicate skin absorption potential.

- What is the size of the employee's face? Some manufacturers offer the same model respirator in two or three sizes. This will help to fit most employees properly with one brand of respirator.

- What types of respirators will give the required maximum use concentration (MUC)? The MUC is a measure of the degree of protection provided by a respirator to a wearer. It takes into account the respirator limitations and the ability of a user to get a satisfactory fit. Multiplying the PEL (or STEL) by the protection factor assigned to a respirator gives the MUC of the hazardous material for which the respirator can be used.

201.4 AIR PURIFYING RESPIRATORS

201.4.1 General Considerations and Limitations

- Chemical cartridge respirators will not be used in environments immediately dangerous to life or health (IDLH) or in atmospheres containing less than 19.5 percent oxygen.

- Warning Properties of Contaminant - Chemical cartridge respirators will not be used for exposures to air contaminants that cannot be easily detected by odor or irritations. For example, cartridge respirators should not be used to protect against methyl chloride or hydrogen sulfide. The former is odorless; and the later, while foul smelling, paralyzes the olfactory nerve so quickly that odor detection is unreliable.

- Irritation - When working in environments where concentrations are irritating to the eyes, full facepiece respirators will be used.

- Chemical cartridge respirators cannot be used for protection against gases that are not effectively stopped by chemical filters utilized; for example, carbon monoxide.

201.4.2 Cartridge Selection

- Select the cartridge or cartridge/filter group that best fits the type of exposure. Using the wrong cartridge and filter may be like using no respirator at all. For example, acid

gas respirators cannot be used for protection against organic vapors. However, an organic vapor-acid gas respirator can be used for one or both of the exposures. Check and recheck the label on the cartridges to make sure the correct ones are issued.

201.4.3 Respirator Use

- After correct cartridges have been selected, screw each cartridge into the facepiece after checking it for intactness; see SOP HS-203, Respirator Inspection, Care, Maintenance and Storage. Make sure cartridge seals (usually part of packaging) have been removed.

- Fit the respirator as outlined in SOP HS-202, Respirator Fit Testing.

- The cartridges may be used until the odor of the contaminant can be smelled, irritation occurs or the substance can be tasted by the wearer.

- Do not use cartridges after expiration date printed on the label.

- If the facepiece and cartridges are used by one employee and the cartridges are not used until exhaustion, they may be resealed after use, by the employee, and reused at a future time. This may be done until cartridge exhaustion.

- Inspect, clean and maintain respirators as outlined in SOP HS-203, Respirator Inspection, Care, Maintenance and Storage.

- Most respirator manufacturers now supply a given model respirator in different sizes so that many employees can be fitted with a single brand of respirator.

201.5 SELF-CONTAINED BREATHING APPARATUS

The self-contained breathing apparatus (SCBA) affords complete respiratory protection in any atmosphere for which the lungs are the principal route of entry into the body. They supply the wearer with cool, non-contaminated breathing air, as demanded by the wearer, at approximately ambient atmospheric pressure. For specific instructions on SCBA units, consult the SCBA manufacturer's manual.

201.5.1 Component Parts

- A cylinder and valve to contain a supply of compressed air.

- A high-pressure, flexible hose that routes the compressed air from the cylinder to the regulator.

- An audible alarm that rings to indicate low cylinder air pressure.

- A pressure-demand regulator that reduces the cylinder pressure to a breathable pressure and supplies the wearer with air in direct response to breathing requirements. All entry or re-entry into immediately dangerous or hazardous atmospheres require the use of a pressure-demand regulatory.

- A facepiece assembly consisting of a rubber facepiece and lens, with head band, exhalation valve, and breathing tube.

- A carrier and harness on which the cylinder is mounted and by which the entire apparatus is worn.

201.5.2 General Checking Procedure

A check of the breathing apparatus is very important to ensure its proper operation. Keep records of these inspections. The following procedure should be followed:

- Put on breathing apparatus.

- Check its normal regulator cycling under exertion or extremely deep breaths.

- Check functioning of emergency bypass.

- Disconnect breathing tube from regulator and place bottom of tube tightly on palm. Inhale to check seal. Reconnect breathing tube.

- Take off breathing apparatus and close cylinder valve.

- Observe both gauges to see if they correspond, and check for air leaks in system.

- Crack emergency bypass or use facepiece and slowly reduce air pressure on regulator gauge to determine that the audible alarm activates at the proper pressure.

- Check:
  - Condition of straps on harness.
  - Tightness of screws and fasteners on: straps regulator bracket all valve handles.
  - Rechecking devices on: main line valve cylinder valve carrier to secure cylinder. Note holes in diaphragm cap on regulator to see if open.
  - Facepiece: should be clean, head band in good condition, exhalation valve not sticking or held open inhalation valve not sticking or held open speaking diaphragm and gasket in correctly.

- Gaskets should be in good condition at:
  - Regulator side of breathing tube.
  - Facepiece where breathing tube connects.
  - Speaking diaphragm assembly.
  - O-ring in coupling that connects to cylinder valve.

- Audible alarm bell cap is tight.

- All threads in good condition.

- Hydrostatic test data is current.

- Cylinder pressure at least 1500 psi, 1800 psi, or 4000 psi, depending on model.

- Sanitize facepiece as outlined in SOP HS-203, Respirator Inspection, Care, Maintenance, and Storage. Return facepiece to plastic bag.

NOTE: If the diaphragm cap is removed to check condition of the diaphragm and level assembly, then this unit must be correctly reassembled to operate properly. If the diaphragm is removed, an operational test of the SCBA must be performed before returning the unit to service.

201.6 WARNINGS RELATED TO RESPIRATOR SELECTION AND USE

- Failure to properly select the appropriate respirator for all the materials and concentrations (to which the respirator wearer may be exposed) may result in serious illness, disability, or death of the affected worker.

- Only self-contained positive pressure breathing apparatus are designed for use in:
  - Oxygen deficient atmospheres (an atmosphere of less than 19.5 percent oxygen by volume at sea level).
  - Poorly ventilated areas or confined spaces such as tanks, small rooms, tunnels or vessels, unless the confined space is well ventilated and the concentration of toxic contaminants is known to be below the upper limit recommended for the respirator.
  - Atmospheres where the concentrations of toxic contaminants are unknown or are IDLH.
  - For fire fighting.
  - At concentrations of substances higher than the upper limits recommended for air purifying respirators.

- Immediately leave the area and replace the respirator if:
  - Breathing becomes difficult; dizziness or other distress occurs.
  - Sense irritation and/or smell or taste the contaminants.

- If the respirator becomes damaged.

- The respirator selected must properly fit the wearer. Carefully follow the fitting instructions, fit tests, and fit checks contained in the Instruction Booklet that accompanies each respirator to make certain the respirator fits and operates properly (also see HS-202, Respirator Fit Testing).

- If the worker is exposed to two or more contaminants for which different air-purifying elements are recommended (e.g., ammonia and benzene) and a combination element is not available, then air supplied respirators should be used.

- Some toxic contaminants are readily absorbed through the skin. In these cases, appropriate gloves and/or protective clothing may be required to protect other areas of the body that might be exposed to the contaminant.

- Respirators should not be used by individuals with beard or other facial hair that passes between the sealing flange of the respirator facepiece and the wearer's face. Facial hair may cause leakage or interfere with the proper operation of the respirator exhalation valve, thereby exposing the wearer to the hazardous contaminants.

- Air-purifying respirator should not be used for sandblasting or for gas or vapor contaminants with poor warning properties.

- Any air-purifying respirator, when properly selected and fitted, will significantly reduce, but will not completely eliminate, the breathing of contaminant(s) by the respirator wearer. The wearer, when working in atmospheres containing substances such as asbestos (that are reputed to cause cancer in amounts below their TLV) will obtain better protection from a continuous flow or positive pressure air supplied respirator.

201.7 SPECIAL RESPIRATOR-USE PROBLEMS

Facial hair lying between the sealing surface of a respirator face piece and the wearer's skin will prevent a good seal. Except with positive pressure air-line respirators, powered air-purifying respirators, and pressure-demand SCBA, a negative pressure exists within the mask upon inhalation; a poor seal will permit contaminated air to enter the facepiece. Even a few days' growth of beard can permit contaminant penetration.

Respirators should not be worn when conditions prevent a good seal of the facepiece to the face. Facial hair in the form of beards, mustaches, sideburns, and stubble should not be permitted on employees required to wear respirators, if the hair comes between the facepiece sealing surface and the face.

201.7.1 Corrective Lenses

Employees wearing corrective eye glasses present a special problem with respect to respiratory protection. Spectacle temple bars, or straps that pass between the sealing surface of a full facepiece respirator and the wearer's face, prevent a good seal and thus must not be worn.

Spectacles with short temple bars that do not interfere with respirator sealing and are taped to the employee's face may be used temporarily. Special corrective lenses or spectacle inserts that can be permanently mounted inside a full facepiece respirator are available from most manufacturers. Such corrective lenses should be mounted in the facepiece such that it ensures good vision and comfort.

Spectacles or goggles may also interfere with quarter or half-mask sealing; in this case a full facepiece respirator should be employed.

Contact lenses should not be worn while wearing a respirator in a contaminated atmosphere. Contaminants may get into the eyes and cause severe irritation and/or discomfort with quarter or half-masks. Full facepieces can pull at the side of the eye and pop out the lens.

201.7.2 Cold Weather Use of Respirator

Under cold weather conditions a number of problems can develop, such as fogging of full facepiece respirators, valve sticking and rubber stiffness that prevents good facial seal.

Fogging of full facepiece respirators can be eliminated easily by installing a nose-cup into the facepiece. This device, available from most manufacturers, deflects the exhalation breath away from the cold facepiece lens. Defogging solution should also be used.

Other cold weather problems should be discussed with the respirator manufacturer.

201.7.3 Voice Communication

Under some conditions it is necessary for respirator wearers to communicate with other personnel within or outside the contaminated area. When this is necessary, special communicating equipment, generally available from the respirator manufacturer, can be installed inside the facepiece. If penetration of the facepiece or altering of the respirator in any way is necessary to install communications equipment, check with the respirator manufacturer to be sure that the NIOSH/OSHA approval will not be voided by the installation.

201.8 POWERED AIR-PURIFYING RESPIRATORS

Powered air-purifying respirators protect against particulates and/or gases and vapors. The great advantage of the powered air-purifying respirator is that it usually supplies air at a positive pressure so that any leakage is outward from the facepiece. It may be used with a helmet, hood or facepiece. Air can be supplied by a user mounted, battery powered backpack purifier, or by a stationary pump through up to 25 feet of low pressure hose. It has good applicability to abrasive blasting, grinding, pesticide spraying and operations using asbestos.

Generally, powered air-purifying units can be used up to 25 times the PEL for dusts, mists, and fumes, when used with filters that are approved for materials with PELs not less than 0.05 mg/m^3 or 2 mppcf and nuisance dusts. Such respirators can be used up to 25 times the PEL when used with high efficiency filters. For use in chemical vapor or gaseous atmospheres, the MUC depends on the chemical cartridge or canister used. In all cases check the manufacturer's specifications and the NIOSH/MSHA approval for the particular configuration used. Consideration should first be given to standard air-purifying units, supplied air devices, and SCBA.

201.9 DISPOSABLE RESPIRATORY PROTECTION EQUIPMENT

The use of disposable respiratory protection devices eliminates the need to clean, disinfect, inspect and repair equipment. Since the cleaning and maintenance aspects of a respiratory protection program can require time and dollar expenditures, the use of equipment not requiring such services may be desirable in some instances. While the cost of disposable equipment may, in some cases, be higher than comparable reusable devises, this cost may be offset or recoverable by the savings of labor and capital investments for cleaning and inspection facilities.

Disposable chemical vapor or gas respirators might be used economically where limited numbers of this type of respirator are in use or where specific operations are performed infrequently.

201.10 REFERENCES

American Conference of Governmental Industrial Hygienists, TLVs, Threshold Limit Values for Chemical Substances and Physical Agents in the Work Environment 1984-85, ACGIH, Cincinnati, Ohio.

American National Standard, Practices for Respiratory Protection ANSI Z88.2-1980, American National Standards Institute, New York.

Birkner, L.R., Respirator Protection, A Manual and Guideline, American Industrial Hygiene Association, 1980.

National Institute for Occupational Safety and Health, A Guide to Industrial Respiratory Protection, DHEW (NIOSH) Publication 76-189, U. S. Government Printing Office, Washington, April 1979.

National Institute for Occupational Safety and Health, Occupational Health Guidelines for Chemical Hazards, DHHS (NIOSH) Publication No. 81-123, U. S. Government Printing Office, Washington, January 1981.

NIOSH/OSHA Pocket Guide to Chemical Hazards, U. S. DHEW (NIOSH), Publication No. 78-210, September 1978.

U. S. Department of Labor, Occupational Safety and Health Administration, OSHA Safety and Health Standards for General Industry, Respiratory Protection (29 CFR Part 1910.134), Washington.

OPERATING PROCEDURE NO. HS-202

RESPIRATOR FIT TESTING

202.1 PURPOSE

To identify and to establish respirator fit testing requirements and procedures.

202.2 REQUIREMENTS

In compliance with OSHA regulation 1910.134, all CKY employees whose job assignments require use of non-powered air-purifying respirators (APR) or air-supplied respirators (ASR) that operate in the demand mode. The respirators must be fit tested using the isoamyl acetate (IAA) and/or the irritant smoke (IS) test. Fit tests will be performed to identify the brand and size of respirator that fits each employee and to facilitate final fitting adjustments in the field.

Fit tests must be recorded for each tested employee. The record will include test dates and identify the brands, models, and sizes of respirators tested.

202.3 TEST EQUIPMENT

202.3.1 Isoamyl Acetate Test

- Isoamyl acetate (USP grade in bottles or in ampules).
- Two bottles for odor recognition testing.

202.4 TESTING PROCEDURES

202.4.1 Isoamyl Acetate (IAA) Test

- The wearer will put on the respirator and adjusts the facepiece and head straps to achieve a snug, comfortable fit. The positive-negative pressure test (see Section 202.4.4) should be applied at this point. If the respirator is the air-purifying type, it must be equipped with a fresh cartridge(s) or canister designed to protect against organic vapors.

- The wearer is exposed to IAA by entering a test enclosure containing IAA vapors. The wearer is exposed first while holding his/her head still. If the wearer does not smell IAA, he/she is exposed again while performing the activities listed in Section 202.4.3.

- If the wearer does not smell IAA while active and inactive, a satisfactory fit can be assumed. However, if the wearer smells IAA, he/she readjusts the facepiece and/or headstraps, and Step 2 is repeated.

- If the wearer continues to smell IAA, an attempt is made to locate the leakage point. If the leakage point cannot be found or corrected, another respirator of the same brand and size is tried. If the respirator leaks, a respirator of another size or brand is tried.

202.4.2 Irritant Smoke (IS) Test

- The wearer will put on the respirator and adjusts facepiece and head straps to achieve a snug, but comfortable fit. The positive-negative pressure test (see Section 202.4.4) should be applied at this point. If the respirator is the air-purifying type, it must be equipped with a HEPA (high efficiency) filter(s).

- The wearer stands with his/her back towards a fume hood or other ventilation source and is asked to keep his/her eyes closed during the test. (Note: eyes must be closed even when full-face respirators are tested.)

- With the wearer holding his/her head still, the tester lightly puffs smoke over the facepiece, holding the tube at least 2 feet from it. The volume of smoke should be kept minimal and the wearer's reaction observed between puffs.

- If the wearer detects no leakage, the tester increases smoke density and moves the tube progressively closer to the wearer, but no closer than 6 inches. If no leakage is detected, exposure is continued while the wearer performs the activities listed in Section 202.4.3.

- If no leakage is detected with and without head movements, a satisfactory fit can be assumed. However, if leakage is detected, smoke generation should be stopped and Steps 3 and 4 repeated after the wearer readjusts the facepiece and/or head straps.

- If a respirator under test continues to leak, another respirator of the same brand, model, and size should be tried. If it does not pass the test, another size or another brand should be tried.

202.4.3 Activities

If no leakage occurs during the IAA or IS test while the wearer is holding his/her head still, the test will be continued while the wearer is instructed to perform the following activities:

- Deep breathing as in heavy exertion. This activity should not be done long enough to cause hyperventilation.

- Side-to-side, then up-and-down head movements (exaggerated).

- Read the "Rainbow Passage." Must be loud enough to be heard by someone standing nearby.

202.4.4 Positive-Negative Pressure Tests

These tests can be performed by the wearer alone and requires no special equipment. The tests should be performed only on respirators that have passed the IAA or IS tests and for preliminary fitting during the IAA and IS tests.

In the positive pressure test, the wearer closes off the exhalation value of the respirator by gently placing his/her palm over the valve and gently exhales into the facepiece. The fit is considered satisfactory if a slight pressure builds up in the facepiece without any evidence of outward leakage.

In the negative pressure test, the wearer closes off the inlet of the canister, cartridge(s) or filter(s) with his/her palm or of the breathing tube of a SA respirator by squeezing the tube and inhaling gently so that the facepiece collapses slightly. Breath is held for about 10 seconds. If the facepiece remains slightly collapsed and no inward leakage is detected during the 10 second period, fit may be considered satisfactory.

202.5 TEST FREQUENCY

An IAA and/or IS test must be performed whenever an employee is provided: (1) a respirator for the first time and (2) a replacement respirator of a different brand, model, or size. A test must also be performed whenever: (1) medical records indicate that an employee may have been exposed despite wearing a respirator and (2) an employee complains of having a faulty respirator.

202.6 DOCUMENTATION

Respirator fit-test records must be maintained. Form HS-202 should be used to document the results of each fit test. It should be signed by the individual being tested and also the person administering the test.

FORM HS-202

RESPIRATOR FIT TEST RECORD

1. EMPLOYEE NAME: _____ DATE: _____
   EMPLOYEE NO.: _____
   EMPLOYEE JOB TITLE/DESCRIPTION: _____
   _____

2. EMPLOYER: CKY INCORPORATED ENVIRONMENTAL SERVICES
   LOCATION/ADDRESS: 3480 TORRANCE BOULEVARD, SUITE 100, TORRANCE, CA 90503

3. RESPIRATOR SELECTED: _____
   MANUFACTURER: _____
   NIOSH APPROVAL NUMBER: _____
   MODEL: _____

4. CONDITIONS WHICH COULD AFFECT RESPIRATOR FIT:

___	CLEAN SHAVEN	_____	1-2 DAY BEARD GROWTH
___	2+ DAY GROWTH	_____	MUSTACHE
___	FACIAL SCAR	_____	DENTURES ABSENT
___	GLASSES	_____	NONE

5. FIT CHECK:

NEGATIVE PRESSURE	____	PASS	____	FAIL	____	NOT DONE
POSITIVE PRESSURE	____	PASS	____	FAIL	____	NOT DONE

6. FIT TESTING:

QUANTITATIVE	_____			
QUALITATIVE	ISOAMYL ACETATE	____	IRRITANT SMOKE	_____
	PASS	____	PASS	_____
	FAIL	____	FAIL	_____

   FIT FACTOR _____

   COMMENTS: _____
   _____
   _____

7. EMPLOYEE ACKNOWLEDGMENT OF TEST RESULTS:

   EMPLOYEE NAME/SIGNATURE: _____ DATE: _____

   TEST CONDUCTED BY: _____ DATE: _____

The above respirator fit test was performed on and by the persons listed. The results indicate the performance of the listed respiratory protective device, as fitted on the employee named on this record under controlled conditions. Fit testing, as performed, measures the ability of the respiratory protective device to provide protection to the individual listed. There is no guarantee that this or an identical respiratory protective device will provide adequate protection under conditions other than were present when this test was performed. Improper use, maintenance, or application of this or any other respiratory protective device will reduce or eliminate protection.

OPERATING PROCEDURE NO. HS-203

RESPIRATOR INSPECTION, CARE, MAINTENANCE, AND STORAGE

203.1 PURPOSE

To provide guidance on the proper care and use of respiratory protective devices, to assist in adequately protecting personnel as well as complying with OSHA respiratory protection standard 1910.134. Guidance in the selection of respiratory devices is provided in SOP No. HS 201.

203.2 APPLICABILITY

This procedure is applicable for use in caring for half-face and full-face respirators of either air-purifying or air supplying type. Proper care of respirators is essential for their satisfactory performance. Of importance is respirator inspection, care, maintenance, and storage.

203.3 REQUIREMENTS

OSHA requires, as part of an inspection program, that all respirators be leak checked, a determination that the complete assembly is gas-tight. Follow field inspection procedures to examine the freshly cleaned, reassembled respirator.

Cleaning and Disinfecting: OSHA 1910.134 states "routinely used respirators will be collected, cleaned and disinfected as frequently as necessary to ensure that proper protection is provided" and that emergency use respirators "will be cleaned and disinfected after each use."

The OSHA standard states that "replacement or repair will be done by experienced persons with parts designed for the respirators." Besides being contrary to OSHA requirements, substitution of parts from a different brand or type of respirator invalidates approval (i.e., NIOSH, MSHA) of the device.

OSHA requires that respirators be stored to protect against dust, sunlight, heat, extreme cold, excessive moisture, damaging chemicals, and mechanical damage.

The OSHA standard suggests that respirators be in their original cartons; however, this may provide only minimal protection from mechanical damage.

203.4 INSPECTION

203.4.1 Air-Purifying Respirators

Routinely used air-purifying respirators should be checked as follows before and after each use:

- Examine the facepiece for:
  - Excessive dirt.
  - Cracks, tears, holes, or physical distortion of shape from improper storage.
  - Inflexibility of rubber facepiece (stretch and knead to restore flexibility).
  - Cracked or badly scratched lenses in full facepieces.
  - Incorrectly mounted full facepiece lenses, or broken or missing mounting clips.
  - Cracked or broken air-purifying element holder(s), badly worn threads or missing gasket(s), if required.

- Examine the head straps or head harness for:
  - Breaks.
  - Loss of elasticity.
  - Broken or malfunctioning buckles and attachments.
  - Excessively worn serration on head harness, that might permit slippage (full facepieces only).

- Examine the exhalation valve for the following after removing its cover:
  - Cracks, tears or distortion in the valve material.
  - Improper insertion of the valve body in the facepiece.
  - Cracks, breaks, or chips in the valve body, particularly in the sealing surface.
  - Missing or defective valve cover.
  - Improper installation of the valve in the valve body.
  - Foreign material, such as detergent residue, dust particles or human hair under the valve seat.

- Examine the air-purifying element for:
  - Incorrect cartridge, canister or filter for the hazard.
  - Expired shelf-life date on the cartridge or canister.
  - Incorrect installation, loose connections, missing or worn gasket or cross threading in the holder.
  - Cracks or dents in the outside case of the filter, cartridge or canister, indicated by the absence of sealing material, tape, foil, etc., over the inlet.

- If the device has a corrugated breathing tube, examine it for:

  - Broken or missing end connectors.
  - Missing or loose hose clamps.
  - Deterioration, determined by stretching the tube and looking for cracks.

- Examine the harness of a front- or back-mounted gas mask for:

  - Damage or wear to the canister holder, that may prevent its being held in place.
  - Broken harness straps for fastening.

203.4.2 Atmosphere-Supplying Respirators

For a routinely used atmosphere-supplying device, use the following procedures:

- If the device is a tight-fitting facepiece, use the procedures outlined under air-purifying respirators, except those pertaining to the air-purifying elements.

- If the device is a hood, helmet, blouse or full suit, use the following procedures:

  - Make sure the protective screen is intact and secured correctly over the face shield.
  - Examine the hood, blouse or full suit for rips and tears, seam integrity, etc.
  - Examine the protective face shield, if any, for cracks or breaks or impaired vision.
  - Examine the protective headgear, if required, for general condition with emphasis on the suspension inside the headgear.

- Examine the air supply systems for:

  - Correct operation and condition of all regulators, or other air flow regulators.
  - Integrity and good condition of air supply lines and hoses, including attachment and end fittings.

In addition to the above, for self-contained breathing apparatus (SCBA) units also determine that:

- The high pressure cylinder of compressed air or oxygen is sufficiently charged for the intended use, preferably full charged.

- On closed circuit SCBA, a fresh canister of CO_2 (carbon dioxide) sorbet is installed.

- On open circuit SCBA, the cylinder has been recharged if less than 25 percent of the useful service time remains.

All SCBAs are required to have a warning device that indicates when the 25 percent level is reached. It is recommended that an open-circuit SCBA be fully charged before use.

203.4.3 Respirator Disassembly

The used respirators should be collected and deposited in a central location. They are taken to an area where the filters, cartridges or canisters are removed and discarded. Canisters should be damaged or marked to prevent accidental reuse. If facepieces are equipped with reusable dust filters, they may be cleaned with compressed air in a hood. This prevents dust from getting into the room and affecting the respirator personnel. If SCBA are used, tanks are removed and connected to an area where the SCBA regulators and low-air warning devices are tested. SCBA facepieces are cleaned like air-purifying respirator facepieces.

203.4.4 Defects Found in Field Inspection

If defects are found during any field inspection, two remedies are possible. If the defect is minor, repair and/or adjustment may be made on the spot. If it is major, the device should be removed from service until it can be repaired. (A spare unit should replace the unit removed from service.) Under no circumstances should a device that is known to be defective remain in the field.

203.4.5 Inspection During Cleaning

Because respirator cleaning usually involves some disassembly, it presents a good opportunity to examine each respirator thoroughly. The procedures outlined above for a field inspection should be used. Respirators should be inspected after cleaning operations and reassembly have been accomplished.

A simple test enclosure can be constructed by cutting a small slit at the center of the closed end of a clear plastic bag and inserting the hook of a wire clothes hanger through the slit so that the bag will hand open side down. The bag should be at least 3 mil thick and approximately the size of a large garbage bag.

203.5 RESPIRATOR CARE

Respirators should be exchanged daily for cleaning and inspection when routinely used. For respirators that are used only occasionally, the exchange period could be weekly or monthly. Workers maintaining their own respirators should be thoroughly briefed on cleaning and disinfecting them. Although workers may not be required to maintain their

own respirators, briefing on the cleaning procedure will encourage their acceptance of a respirator by providing knowledge of what is a clean, disinfected, properly maintained device. This is particularly important where respirators are not individually assigned.

Where respirators are individually assigned (a practice to be encouraged), they should be identified to ensure that the worker always receives the same device. Identification markers must not penetrate the facepiece, block the filter, cartridge parts or exhaust valves.

When a relatively small number of respirators are used, or where workers clean their own respirators, the generally accepted procedure is washing with detergent and warm water using a brush, thoroughly rinsing in clean water, and drying in a clean place. Precautions should be taken to prevent damage from rough handling during this procedure.

When large numbers of respirators are used, it is recommended that centralized cleaning and maintenance be performed and that specialized equipment and personnel trained in respirator maintenance be used.

203.5.1 Cleaning and Sanitizing

The actual cleaning may be done in a variety of ways. A commercial dishwasher can be used. A standard domestic clothes washer may also be used if a rack is installed around the agitator to hold the facepieces in fixed positions. If the facepieces are placed loose in the washer, the agitator may damage them. A standard domestic dishwasher may be used, but it is not preferred because it does not immerse the facepieces. any good detergent may be used followed by a disinfecting rinse or a combination disinfectant-detergent for a one step operation. Disinfection is not absolutely necessary if the respirator is reused by the same person. However, where individual issue is not practical, disinfection is strongly recommended. Reliable, effective disinfectants may be made from readily available household solutions, including:

- Hypochlorite solution (50 ppm of chlorine) made by adding approximately two milliliters of bleach (such as Chlorox) to one liter of water, or two tablespoons of bleach per gallon of water. A two-minute immersion disinfects the respirators.

- Aqueous solution of iodine (50 ppm of iodine) made by adding approximately 0.8 milliliters of tincture of iodine per liter of water, or one teaspoon of tincture of iodine per gallon of water. Again, a two-minute immersion is sufficient.

If the respirators are washed by hand, a separate disinfecting rinse may be provided. If a washing machine or dishwasher is used, the disinfectant must be added to the rinse cycle; the amount of water in the machine at that time will have to he measured to determine the correct amount of disinfectant.

To prevent damaging the rubber and plastic in the respirator facepieces, the cleaning water temperature should be between 120°F to 140°F to ensure adequate cleaning. In addition, if commercial or domestic dishwashers are used, the drying cycle should be eliminated, since the temperatures reached in these cycles may damage the respirators.

203.5.2 Rinsing

The cleaning and disinfected respirators should be rinsed thoroughly in water (140°F maximum) to remove all traces of detergent and disinfectants. This is very important for preventing dermatitis.

203.5.3 Drying

The respirators may be allowed to dry in room air on a clean surface. They may also be hung from a horizontal wire, like drying clothes, but care must be taken not to damage or distort the facepieces. Another method is to equip a standard steel storage cabinet with an electric heater that has a built-in circulating fan, and to replace the solid steel shelves with steel mesh.

203.5.4 Assembly and Inspection

The clean, dry respirator facepieces should be reassembled and inspected in an area separate from the disassembly area to avoid contamination. The inspection procedures have been discussed; special emphasis should be given to inspecting the respirators for detergent or soap residue left by inadequate rinsing. This appears most often under the seat of the exhalation valve, and can cause valve leakage or sticking.

The respirator should be thoroughly inspected and all defects corrected. New or retested cartridges and canisters should be installed, and the completely reassembled respirator should be tested for leaks.

203.6 MAINTENANCE AND REPAIR

Maintenance personnel must be thoroughly trained. They must be aware of the limitations and never try to replace components or make repairs and adjustments beyond the manufacturer's recommendations, unless they have been specially trained by the manufacturer.

These restrictions apply primarily to maintenance of the more complicated devices, especially closed- and open-circuit SCBA, and more specifically, regulator valves and low pressures warning devices. These devices should be returned to the manufacturer or to a trained technician for adjustment or repair. There should be no major problems in

repairing and maintaining most respirators, particularly the commonly used air-purifying type.

An important aspect of a maintenance program is having enough spare parts on hand. Only continual surveillance of replacement rates will determine what parts and quantities should be kept in stock. It is desirable to have a recording system to indicate spare parts usage and the inventory on hand.

For SCBA devises, the facepiece should be combined with the tested regulator and the fully charged cylinder, and an operational check performed.

203.7 RESPIRATOR STORAGE

Damage and contamination of respirators may take place if they are stored on a workbench, or in a tool cabinet or toolbox, among heavy tools, greases and dirt. Freshly cleaned respirators should be placed in heat-sealed, ziplock, or other reusable plastic bags until reissue. They should be stored in a clean, dry location away from direct sunlight. They should be placed in a single layer with the facepiece and exhalation valve in an undistorted position to prevent rubber or plastic from taking a permanent distorted "set."

Air-purifying respirators kept ready for non-routine or emergency used should be stored in a cabinet with individual compartments. The storage cabinet should be readily accessible, and all workers should be made aware of its location, as is done for fire extinguisher. Preventing serious injury from the inhalation of a toxic substance depends entirely on how quickly workers can get to the emergency respirators.

A chest or wall-mounted case may be used for storing SCBA for use in emergencies. Again, the location of SCBA should be well-known and clearly marked. Unlike fire extinguisher, they should be located in an area that will remain uncontaminated. Putting on a SCBA in a highly contaminated atmosphere such as might be created by massive release of a toxic material may take too long a time to perform safety in that area.

Therefore, the first reaction should be to escape to an uncontaminated area, then put on the SCBA, that should be located there, and re-enter the hazardous area for whatever task must be done. Exceptions to this rule may be encountered, and only a thorough evaluation of the process and escape routes will permit a final decision about the correct storage location for SCBA. Respirators should be stored in a plastic bag inside a rigid container.

Workers who are adequately trained should develop a respect for respirators that will be an automatic incentive to protect respirators from damage. Besides providing better

assurance of adequate protection, this training will lower maintenance costs by decreasing damage.

203.8 RECORDKEEPING

Records should be maintained to document that proper care and maintenance has been performed on respiratory protection devices. Records should indicate when and what was done to each respirator, and also by whom.

203.9 REFERENCES

American National Standard, Practices for Respiratory Protection, ANSI Z88.2, American National Standards Institute, 1980.

Birkner, L.R., Respiratory Protection A Manual and Guideline, American Industrial Hygiene Association, 1980.

U. S. Department of Labor, Occupational Safety and Health Administration, Safety and Health for General Industry, Respiratory Protection (29 CFR Part 1910.134).

OPERATING PROCEDURE NO. HS-204

SELECTION AND USE OF PERSONAL PROTECTIVE EQUIPMENT

204.1 PURPOSE

To set forth the criteria and methodology to be used in selecting personal protective equipment (PPE) for use on hazardous waste management projects. HS-204 has been developed to standardize the approach for selecting PPE.

PPE is a means of isolating a worker from a potential exposure to a contaminant source. Physically isolating the sources from the surrounding work environment is generally not possible on hazardous waste sites; thus, the field worker must be isolated from the work area. Use of PPE places a high degree of responsibility for safety on the field worker. Exposure can occur during lapses in standard operating procedures, failure of protective equipment, removal of protective equipment at the end of work periods, or use of improper or damaged equipment. A properly administered PPE program can offer an effective means of control or as a supplement or backup to controls at the source of hazards.

PPE associated with hazardous waste field investigations and remediation work can be divided into three categories:

- Safety equipment (e.g., hard hats, shoes, safety glasses, face shields).
- Protective clothing (e.g., gloves, boots, aprons, coveralls).
- Respiratory devises (e.g., half and full face air purifying respirators, supplied air respirators, and airline SCBAs).

The proper selection of PPE is an extremely important task. The use of improper equipment can result in the lack of protection from a specific hazard causing potential injury or adverse health effects to personnel. Personal protective equipment should be selected that is appropriate to a given hazard (existing or expected) with a factor of safety. Over protection is not necessarily appropriate and can result in other potential problems (i.e., heat stress, fatigue, physical hazards).

Selection of PPE should be based on identifying the potential hazards based on available data and then choosing the appropriate level of protection required.

204.3 APPLICABILITY

HS-204 is designed as a guideline for personnel with basic knowledge and training in the selection and use of PPE. It is applicable to selection of PPE for use in field or laboratory

activities associated with hazardous waste handling, site investigations, or remediation projects.

204.4 IDENTIFICATION OF POTENTIAL HAZARDS

An evaluation of the potential hazards associated with a given site and planned work activities should be performed. This should be included in development of a site safety plan, and completion of a site safety evaluation form (see SOP No. HS-301 and Section 5.0 of the Health and Safety Manual).

204.5 LEVELS OF PROTECTION

Potential hazards associated with contaminants may be minimized by protecting against exposures to toxic materials using appropriate PPE. PPE to protect the body against contact with known or anticipated chemical hazards has been divided into four categories (i.e., Levels A, B, C, and D) according to the degree of protection afforded. Level A provides the greatest degree of personal protection while Level D provides the least. A summary of the four levels of protection is presented in Table HS-204.1.

The importance of PPE is related to the degree of hazard presented by a particular compound and given situation. The four principle types of hazards include dermal absorption or contact, eye contact, inhalation, and ingestion. With dermal absorption, protective clothing is the major personal protective measure required. Eye contact is eliminated by wearing safety glasses or a full-face respirator. Respiratory protection is required for inhalation hazards. The primary mechanism for protection against ingestion is the use of good personal hygiene and good work practices.

204.6 SAFETY EQUIPMENT

The use of safety equipment (such as hard hats, shoes, etc.) is considered to be basic knowledge of personnel involved with field operations. It is expected that field personnel are versed in basic safety equipment. Subsequent discussions focus on additional PPE that provides protection from contaminant exposures.

204.7 PROTECTIVE CLOTHING

The category of protective clothing includes: clothing, gloves, boots, face shields, and head wear. The choice of clothing to be used should be based on the potential exposure hazards anticipated, the amount of body coverage required, and the material used in clothing construction. To protect the wearer from exposure, the clothing material should be impermeable or at least resistant to the particular hazardous agents expected to be encountered.

Data on the suitability of various types of protective clothing for particular hazards are often limited to manufacturers' bulletins, brochures, or information services. Literature on permeability of various materials is limited.

With certain compounds where even minor skin contact may present potential problems, taping of the joints between sleeve and glove, leg and boot and entry seam on the protective clothing is a recommended practice. Removal of exterior pockets on coats and coveralls reduces accumulation of contaminants. Hair coverings should also be used to prevent scalp exposure. Disposable clothing that offers adequate protection (i.e., Tyvek, Polycoated Tyvek, or Saranex) is an excellent alternative, especially where there are problems with decontamination and cleaning of regular work clothing, and may be less costly than controlled laundering of clothing contaminated with highly toxic materials. Care must be exercised when removing contaminated clothing, to prevent exposure to any contaminant compounds present on the outer surface of the protective clothing.

204.8 RESPIRATORY PROTECTION

Respiratory protection is used to reduce exposures involving potential inhalation hazards. Cost effectiveness, acceptability, ease of use, and ability of the worker to wear devices are considerations in determining the proper use of respiratory protective devices.

The minimum requirements of an acceptable respirator program are set forth in Title 29 CFR 1910.134. The program should include proper equipment selection, training, employee evaluation, supervision and enforcement, and an adequate maintenance program.

Respiratory protection is generally used during the time period necessary to install or implement engineering or work practice controls, during plant maintenance, during emergencies or non-routine operation, or in situations where complete control is not achievable through feasible engineering measures such as with hazardous waste sites. Also, if engineering controls are not sufficient to reduce exposure to within permissible limits with the necessary degree of confidence, then respiratory protection can be implemented, in addition to engineering controls, to further reduce the possibility of exposure.

Typical full body protection, when required, might include an impermeable suit with boots, gloves, and a supplied air hood or SCBA. All suit joints should be taped to prevent leakage between arm and glove as well as leg and boot. In some cases, an air purifying respirator may be required instead of the supplied air hood. After use, all respiratory protective equipment and reusable clothing should be taken to a decontamination and repair station. Care should be taken to prevent skin contact with the exterior of contaminated clothing items as they are removed. A partial decontamination procedure may be necessary prior to removal for this purpose.

In general, respiratory protection may be most effectively used in emergency or upset conditions that offer greater potential hazards. In event of emergency, respiratory protection can be used to minimize exposure during escape or until the situation is under control. In an area equipped with monitoring devices, alarms can signal potential hazards and trigger use of respiratory protection.

An important key to any respiratory protection program is the training and motivation of individuals. Major emphasis should be placed both on the need to wear respirators and on proper respirator use. In most cases, training should be done in small groups to allow better communication with individual employees. Enforcement by first-line supervisors or peers is often essential. A selection of several brands of approved respirators should be maintained in order to fit all employees properly. In instances where a fit cannot be obtained with a half-mask respirator, or where exposures present greater hazard potential, or eye or skin protection is necessary, a full facepiece respirator may afford a better fit. Appropriate data sheets on employee training, respirator fitting and use are often helpful.

204.9 ADDITIONAL HAZARDS

When working around heavy machinery, in unfamiliar areas or places with discarded equipment, drums, etc., there exists the potential for physical hazards. These include slipping, tripping, falling objects, electrical shocks, punctures, missiles, scraping, and catching hazards. The effects of many of these types of hazards can be mitigated with the use of some basic safety equipment (i.e., hard hats, safety shoes, safety glasses, etc.).

The use of some PPE (i.e., respirators, gloves, protective clothing, etc.) can increase the potential for physical hazards. Some of this equipment can reduce mobility, obscure vision, cause fatigue, and can increase the potential for tripping, falling, and catching. Care must be exercised when using PPE to protect against one hazard while creating another. Awareness, in specific site situations, of the relative risk associated with the various potential hazards is necessary. This includes hazards posed by PPE.

204.10 REFERENCES

Gideon, J.A., E.R. Kennedy, D.M. O'Brien, J.T. Talty, Controlling Occupational Exposures, Principles and Practices, U. S. DHEW, PHS, NIOSH, May 1979.

U. S. Environmental Protection Agency Interim Standard Operating Safety Guides, EPA Office of Emergency Response and Remedial Response, Hazardous Response Support Division, September 1982.

TABLE HS-204.1

FOUR LEVELS OF PERSONAL PROTECTIVE EQUIPMENT

LEVEL D - Level D consists of the basic work uniform which includes:

- Hard hat
- Safety glasses
- Steel-toed, steel-shank boots (leather or chemical resistant)
- Work gloves (cloth, leather, or waterproof)
- An immediately available half-face, air-purifying respirator with NIOSH-approved combination organic vapor/high efficiency particulate (HEPA) cartridges.
- Optional Tyvek coveralls with hood

LEVEL C - Level C consists of the below listed protective equipment:

- Hard hat
- Safety glasses
- Chemical resistant steel-toed, steel-shank boots
- Chemical resistant gloves (e.g., nitrile or neoprene)
- Respirator with organic vapor/HEPA cartridges
- Chemical resistant clothing (e.g., Tyvek or Saranex coveralls with hood)
- 2-way radio communications

LEVEL B - Level B consists of the below listed protective equipment:

- Hard hat
- Safety glasses
- Chemical resistant steel-toed, steel-shank boots with optional boot covers
- Chemical resistant inner gloves (e.g., viton or butyl)
- Pressure-demand full-facepiece SCBA or pressure-demand supplied-air respirator with escape SCBA
- Chemical resistant clothing (e.g., Tyvek or Saranex coveralls with hood)
- Chemical resistant leggings and/or sleeve protectors
- 2-way radio communications

LEVEL A - Level A consists of the below listed protective equipment:

- Hard hat
- Safety glasses
- Chemical resistant steel-toed, steel-shank boots with boot covers
- Chemical resistant inner gloves

- Pressure-demand full-facepiece SCBA or pressure-demand supplied-air respirator with escape SCBA
- Fully-encapsulating chemical resistant suit
- Chemical resistant leggings and/or sleeve protectors
- 2-way radio communications

OPERATING PROCEDURE HS-501

PERSONNEL DECONTAMINATION

501.1 PURPOSE

Personnel engaged in hazardous waste site investigation or remediation can become contaminated in several ways, including being splashed with liquid chemical products or contaminated water while drilling, developing, testing, and sampling wells; handling chemical wastes, contaminated soil or water, or contaminated equipment; walking on contaminated soil or through contaminated surface water; and contact with chemical vapors, dusts, fumes, and mists. Although protective clothing helps prevent the wearer from becoming contaminated, contamination can occur. Decontamination reduces dermal exposure time. It also prevents hazardous materials from being transferred from protective clothing to wearer and to clean areas where unprotected individuals can be exposed.

Decontamination consists of removing contaminated clothing and washing the skin to remove contaminants. How extensive the decontamination process must be depends primarily on the types of contaminants and the nature of on-site activities planned. As the toxicity of the contaminants and the magnitude of potential contamination of personnel increases, the decontamination process becomes increasingly more extensive and thorough. This operating procedure describes decontamination guidelines. Procedures for field operations must be developed on a site-by-site basis.

501.2 RESPONSIBLE AUTHORITY

Decontamination operations at each hazardous waste site shall be supervised by the Site Health and Safety Officer.

501.3 DECONTAMINATION PROCEDURES

501.3.1 Equipment Worn

- Full-face respirator with canister or cartridges
- Hard hat
- Chemical-resistant safety boots with or without boot covers
- Inner and outer gloves
- One piece, hooded, chemical-resistant splash suit (example: polyethylene or Saranex-coated Tyvek coverall)

501.3.2 Decontamination Facility Set Up

The decon facility should have a minimum of four stations: (1) segregated equipment drop station; (2) coverall, boot, and glove wash and rinse station; (3) coverall and outer glove removal station; and (4) respirator, boots, and inner glove removal station.

501.3.3 Station 1 - Segregated Equipment Drop

Deposit equipment used in the exclusion zone (e.g. tools, sampling devices and containers, monitoring instruments, radios, clipboards, etc.) on a plastic drop cloth or in plastic-lined containers.

501.3.4 Station 2 - Boot Wash and Rinse

Step into the first container of decontamination solution and scrub bottom and sides of boots up to taped area to remove gross contamination. After boots have been scrubbed, step into the second container of decontamination solution and repeat the washing process. Finally, step into container of rinse water and rinse boots thoroughly. Proceed to Station 3.

501.3.5 Station 3 - Outer Glove Wash and Rinse

Place gloved hands in container or decontamination solution and wash gloves. Use a brush if necessary. After washing the gloves, place hands in container of rinse water and rinse gloves thoroughly. This station and Station 2 may be combined into one station if protective equipment is not grossly contaminated.

501.3.6 Station 4 - Coverall and Outer Glove Removal

If used, remove tape from legs and wrists as well as from coverall zipper. Then, remove coverall and gloves in that order. Care must be taken to prevent transfer of contaminants from coverall to underclothes. Transfer can be minimized by rolling or folding the coverall as it is being removed so that the coverall is turned inside-out. Place tape, coveralls, and outer gloves in the plastic lined receptacle provided at this station.

501.3.7 Station 5 - Respirator, Boot, and Inner Glove Removal

Remove respirator and boots and place them in receptacles provided at this station. Remove inner gloves and discard in receptacle provided.

501.3.8 Station 6 - Hand And Face Wash and Street Shoe Donning

Wash, rinse, and dry hands and face, then don street shoes. If highly toxic, corrosive, or skin absorbable chemicals are known to be present, a shower facility should be set up in the support area and personnel required to shower before leaving the site.

501.4 LEVEL OF PROTECTION FOR DECONTAMINATION PERSONNEL

Personnel assisting in the decontamination process must wear the same personal protective equipment worn by personnel being decontaminated.

501.5 DECONTAMINATION SOLUTION

A decontamination solution should be capable of removing or converting to a harmless substance the contaminant of concern without harming the object being decontaminated. The preferred solution is a mixture of detergent and water, which is a relatively safe option compared to chemical decontaminants. The recommended solution for decontaminating boots and gloves is 1 to 1.5 tablespoons of Alconox per gallon of warm water. Skin surfaces should be decontaminated by washing with hand soap and water. The decontamination solution must be changed when it no longer foams or when it becomes extremely dirty. Rinse water must be changed when it becomes discolored, begins to foam, or when the decontamination solution cannot be removed.

501.6 DECONTAMINATION EQUIPMENT AND SUPPLIES

The following is a list of decontamination equipment and supplies:

- 1 to 2 plastic drop cloths, minimum thickness of 3 mills and minimum size of 9' x 12'.
- 4 to 7 containers, 30 to 50 gallon capacity (galvanized tub, stock tank, or children's wading pool), for washing and rinsing.
- 1 to 2 receptacles (drums or plastic trash cans) for receiving contaminated disposable equipment and trash.
- 1 to 2 55-gallon drums for storage of contaminated wash and rinse water.
- Plastic bags of different sizes for temporary storage of contaminated equipment and for lining trash receptacles.
- 2 to 4 long-handled soft bristled brushes (e.g., toilet brush).
- 3 to 4-inch diameter plastic pipe or 4x4-inch timber to raise edges of drop cloth to contain contaminated wash and rinse water spilled during decontamination. Other methods may be used.
- Detergent (e.g. Alconox) and hand soap.
- Fresh water.
- Paper towels for drying hands, face, and equipment.
- Chairs or benches for personnel to sit on while removing boots.
- Shower facility with lockers (optional).

OPERATING PROCEDURE HS-502

EQUIPMENT DECONTAMINATION

502.1 PURPOSE

To establish guidelines for the decontamination of equipment used at hazardous waste sites to minimize the risk of contaminant exposure to personnel, and minimize the potential for off site migration of contaminants.

502.2 RESPONSIBLE AUTHORITY

Decontamination operations at each hazardous waste site shall be supervised by the Site Health and Safety Officer.

502.3 EQUIPMENT DECONTAMINATION FACILITIES

Decontamination facilities will vary depending on site conditions and the magnitude and duration of individual projects. Mobile decontamination trailers, permanent decontamination stations, or temporary decontamination stations will be provided depending on which type of station is appropriate for each site. Mobile decontamination trailers will be equipped with a 2,000 psi steam cleaner, a portable water supply, and a decontamination water collection system. The trailer will also be equipped with ramps to allow vehicles to drive onto it. The floor of the trailer will be constructed of steel grating over a large catch basin. The catch basin drains to a sump that is pumped to trailer mounted storage tanks. Sidewalls will be erected on the trailer to prevent sprayed water from falling outside of the collection area.

For long-term projects, a permanent equipment decontamination station will be constructed on a concrete or similarly constructed pad with sidewalls. The pad will be sloped to allow decontamination water to run off into a catch basin or similar collection system. The pad will be constructed large enough to hold the largest piece of equipment that will be used at the site. Equipment will be cleaned using a 2,000 psi steam cleaner.

Temporary equipment decontamination stations will consist of visqueen placed on the ground over berming. Side walls will be erected to prevent sprayed water from falling outside of the station. The station will be sloped to allow the collection of decontamination water in a portable sump. Cleaning will be accomplished using a 2,000 psi steam cleaner.

Decontamination water stored in the storage tanks and portable sumps will be sampled and analyzed for proper disposal if required by the treatment/disposal facility. Soil and sludge from the decontamination stations will be collected in appropriate containers and sampled if required by the treatment/disposal facility. Decontamination and disposal of decontamination waste will be performed in accordance with 40 CFR 265.114. Decontamination waste will be treated or disposed of in permitted recycling, treatment, and/or disposal facilities.

502.4 DECONTAMINATION OF LARGE EQUIPMENT AND VEHICLES

All large equipment and vehicles used in the exclusion zone of hazardous waste sites will be decontaminated before they are moved to the support zone. Soil and sediment will be removed from the equipment using hand tools, brushes, brooms, etc. The equipment will then be driven onto the decontamination trailer or station where it will be high pressure rinsed with hot water (minimum 120°F) using a 2,000 psi steam cleaner. The decontamination rinsate will be collected in appropriate containers for recycling, treatment, or disposal, as appropriate. Decontamination will be performed as outlined in the following sections to prevent tracking of potential hazardous materials off site.

502.5 DECONTAMINATION OF SMALL EQUIPMENT AND HAND TOOLS

Small equipment, sampling equipment, and hand tools will be decontaminated using buckets or tubs that are placed on the decontamination trailer or station. If a decontamination trailer or station is not present at the site, visqueen will be placed on the ground over berming to contain any spilled rinsate. The following procedures will be followed for the decontamination of small equipment and hand tools:

- All loose soil and sediment will be removed using bristle brushes.
- The equipment will be washed in a nonphosphate detergent solution using scrub brushes.
- Following the detergent wash, the equipment will be rinsed with tap water.
- As the final step, the equipment will be rinsed in distilled water and allowed to air dry.

The decontamination rinsate will be collected in appropriate containers for recycling, treatment, or disposal, as appropriate.

502.6 REFERENCES

U. S. Environmental Protection Agency, Code of Federal Regulations Title 40 Part 265.114, Disposal or Decontamination of Equipment, Structures, and Soils.

OPERATING PROCEDURE NO. HS-504

SITE CONTROL

504.1 PURPOSE

To provide guidance in establishing site control during hazardous waste site activities. Site control consists of providing for security, communications, layout of site activity facilities (i.e., command post, decontamination area, etc.), setting up work zones, and monitoring of weather conditions.

504.2 SECURITY

Site security should be established to limit access to the site and prevent unauthorized personnel from entering the site area. The following should be considered when providing site security:

- The site should be secured with fencing (i.e., chain link fence, wire, or barriers), as appropriate.
- A security guard should be provided as necessary, and be located in the vicinity of the command post (office trailer).
- A controlled access to the regulated zones should be established. This controlled access should be through a decontamination unit or area.
- Only authorized personnel are permitted to enter regulated zones. No one shall enter the site without appropriate authorization.
- All persons entering the regulated zones shall be equipped with appropriate personal protective devices.
- All persons entering the regulated zones must be familiar with and abide by the health and safety plan.

504.3 COMMUNICATIONS

Methods of maintaining communications on site between site personnel should be provided. Communication between the command post and personnel working in regulated zones should be provided. Communication, as well as visual contact, should be maintained between personnel in regulated zones. Use of the "buddy" system should be practiced. The following methods of communication should be utilized as appropriate:

- Radios
- Hand signals
- Air horns

- Bells
- Flags
- Boards or signs

Emergency information (routes, phone numbers, etc.) should be posted on site.

504.4 SITE LAYOUT

In developing a site layout for site investigation activities and establishing command post, decontamination facilities, etc., the following criteria should be considered:

- Site location and ownership
- Location of roads, power lines, etc.
- Terrain (line-of-sight, avenues of approach, ingress and egress)
- Prevailing wind direction
- Location of sources of water and power
- Proximity to inhabitants or residents
- Location of emergency facilities

504.5 WORK ZONES

Work zones should be established within a site as appropriate depending on the degree of potential hazard and the type of work activities being performed. Areas known or suspected to be of high potential should be designated as regulated or exclusion zones. The immediate areas (e.g., 25-foot radius) around intrusive activities (i.e., drilling, excavating, etc.) may be classified as regulated or exclusionary. Decontamination areas should also be regulated. Appropriate personal protective equipment should be worn by personnel in regulated zones, in accordance with the site specific safety plan for the site. Command posts should be in clean areas upwind of contaminated or exclusionary zones.

504.6 WEATHER CONDITIONS

Monitoring of weather conditions should be performed during site activities as may be appropriate. Monitoring for the following should be considered:

- Wind direction (vane, wind sock, flagging)
- Temperature for heat stress conditions
- Temperature for cold stress conditions

504.7 DOCUMENTATION

Description of site control should be presented in the site safety plan, including a plot plan of the site indicating locations of site features and work facilities. Records should be maintained regarding site access and monitoring of weather conditions. The Site Supervisor or his/her designate will be responsible for monitoring site access and weather conditions.

OPERATING PROCEDURE NO. HS-505

EMERGENCY PREPAREDNESS

505.1 PURPOSE

To provide guidance in preparing for contingency or emergency situations during field activities. Accidents can and do happen. However, with adequate planning and preparedness resulting consequence can be minimized or prevented.

Emergency preparedness starts with advanced planning. It requires anticipation of potential problems or hazards. Proper emergency preparedness involves use of the project health and safety plan that may address emergency situations. It involves training, site orientation of personnel, medical information of personnel, and availability of emergency equipment and services.

505.2 TYPES OF EMERGENCIES

There are three major categories of emergencies that can occur during hazardous waste site activities. They are medical emergencies, accidents, and safety equipment problems.

505.2.1 Medical Emergency

Medical emergencies can be described as situations that present a significant threat to the health of personnel involved in site activities. These can result from chemical exposures, heat stress, cold stress, and poisonous insect or snake bites. Medical emergencies must be dealt with immediately and proper care should be administered. This may be in the form of first aid and emergency hospitalization.

505.2.2 Accidents

Accidents can result from physical hazards on a site. These hazards can include tripping, catching, cutting, and may be associated with debris on a site or heavy equipment used in the investigation. Accidents may include:

- Broken bones
- Burns
- Sprains
- Puncture wounds
- Electrical shock
- Cuts by contaminated materials

Appropriate medical attention must be provided to individuals involved in site activities who have suffered an accident.

505.2.3 Safety Equipment Problems

A source of emergency may develop due to malfunction or other problem associated with safety equipment being utilized by site personnel. These types of problems may or may not result in emergency situations. However, safety equipment problems must be corrected before proceeding with field activities. Safety problems may include:

- Leaks or tears in protective clothing
- Failure of respiratory protective devices (SCBA, air-purifying respirators)
- Encountering contaminants for which prescribed protective equipment may not be suitable

505.3 ADVANCE PLANNING

Advance planning should be practiced and include assessments of potential hazards or problems that may be encountered. Emergency preparedness should be addressed in the site safety plan. It should consider:

- Hazard evaluation
- Emergency precautions
- Hospital/poison control centers (telephone numbers)
- Emergency transportation systems (fire, police, ambulance)
- Emergency routes (maps, dry runs)
- Escape routes:
  - On-site escape (rapid evacuation to safe area)
  - Off-site escape (best means of evacuation from site)

505.4 TRAINING

Field teams should include personnel with training in first aid and CPR. Personnel should become familiar with site area, available equipment, and emergency services available.

505.5 MEDICAL SURVEILLANCE INFORMATION

Personnel should be aware of any special medical problems of individual team members. This may include allergies, insect stings, poison plants, penicillin, etc.

505.6 EMERGENCY EQUIPMENT

Provisions should be made to have appropriate emergency equipment available and in proper working condition. This equipment may include:

- First aid kits
- Eye wash kits - fill and pressurize
- Fire extinguisher
- Emergency oxygen

- Splints
- Stretcher
- Blankets
- Life vests

Equipment should be checked before commencing site activities, and defective equipment repaired or replaced before performing site work. Provisions should be made for redundant or back-up safety equipment.

505.7 SAFETY PRACTICES

The following safety practices should be utilized to prevent or deal with emergency situations:

- A continuous line-of-sight should be maintained between work party downrange and personnel at the command post. Personnel stationed beyond the command post, in order to maintain the line-of-sight with the work party, must be outfitted with appropriate protective equipment.

- Person should be dressed to same degree as the work party in order to provide an extra man for any needed rescue effort.

- Communications should be maintained and work party must have system for rapid and clear distress call back to command post.

- Check to insure that all preplanning information is correct.

- Maintain thorough knowledge of expected weather conditions. Avoid working in wet weather, electrical storms, extremely hot conditions, or extremely cold conditions.

- Thoroughly understand tasks to be performed.

- Thoroughly brief all team members on all aspects of the tasks.

505.8 DOCUMENTATION

Records should be maintained with regard to emergency situations. Incident/Accident Reports should be filed in the event of an incident or accident (see SOP HS-503). The Site Supervisor is responsible for preparing and maintaining the incident or accident report.

APPENDIX G

JOB HAZARD ANALYSIS

KES

HAZARD ANALYSIS

TASK: Mobilization / Demobilization	**JOB TITLE:** Laborers, Operators and Drivers

MINIMUM PERSONNEL PROTECTIVE EQUIPMENT TO BE USED: Level D - Hardhat, Safety-Toed work boots, safety glasses, hearing protection if warranted and standard work clothes (shirts must be at least short sleeved and full length pants). Modified Level D and Level C as indicated in Health and Safety Plan.

JOB STEPS	HAZARDS	RECOMMENDED SOLUTIONS
1. On / off load trucks with equipment and materials	(SBy) Loose / uncontrolled equipment, parts or materials	(ADM) Inspection of truck prior to unloading for possible need of specialized equipment. (ADM) safety inspection of equipment (ADM) Qualified operator on equipment (ENG/ADM) Use taglines and designated spotters
	(E) Physical Hazards	(ADM) Proper housekeeping procedures
	(CW) Rough surfaces and sharp edges	(PPE) Wear work gloves
	(CBe) Shifting loads	(ADM) Avoid pinch point areas
2. Spot trucks or equipment	(SBy) Unstable terrain (CW) Overhead Utilities	(ADM) Move vehicle to stable area (ENG) Maintain clearance between equipment and overhead lines.

Hazard Codes:

CBe – Caught Between
CBy – Contacted By
CW – Contact With
E – Exposure
FB – Fall Below Level
FS – Fall Same Level
SBy – Struck BY
TI – Trapped IN

Recommended Solution Codes:

ADM – Administrative Control
ENG – Engineering Control
PPE – Personnel Protective Equipment

KES

HAZARD ANALYSIS

TASK: Preparatory Site Setup and Site Cleanup	**JOB TITLE:** Laborers, Operators

MINIMUM PERSONNEL PROTECTIVE EQUIPMENT TO BE USED: Level D - Hardhat, Safety-Toed work boots, safety glasses, hearing protection if warranted and standard work clothes (shirts must be at least short sleeved and full length pants). Modified Level D and Level C as indicated in Health and Safety Plan.

JOB STEPS	HAZARDS	RECOMMENDED SOLUTIONS
1. Cleanup of project site / Setup work zones and work areas.	(SBy) Loose / uncontrolled equipment, parts or materials	(ADM) Inspection of site (ADM) Qualified operator on equipment
	(E) Asbestos dust	(ENG) Wet items / area to eliminate dust (PPE) Wear proper PPE
	(CW) Biological hazards	(ADM) Employee Training (PPE) Wear work gloves and proper PPE
	(E) Physical Hazxards	(ADM) Proper housekeeping procedures
	(SO) Lifting injuries	(ADM) Instruction in proper lifting techniques
	(FS) Slips, Trips and Falls	(ADM) Keep areas free of tripping hazards (ADM) Proper housekeeping procedures

Hazard Codes:

CBe – Caught Between
CBy – Contacted By
CW – Contact With
E – Exposure
FB – Fall Below Level
FS – Fall Same Level
SBy – Struck BY
TI – Trapped IN

Recommended Solution Codes:

ADM – Administrative Control
ENG – Engineering Control
PPE – Personnel Protective Equipment

KES

HAZARD ANALYSIS

TASK: Paving

JOB TITLE: Laborers, Operators

MINIMUM PERSONNEL PROTECTIVE EQUIPMENT TO BE USED: Level D - Hardhat, Safety-Toed work boots, safety glasses, hearing protection if warranted and standard work clothes (shirts must be at least short sleeved and full length pants). Modified Level D and Level C as indicated in Health and Safety Plan.

JOB STEPS	HAZARDS	RECOMMENDED SOLUTIONS
1. Site prep, laying asphalt, compacting.	(SBy) Loose / uncontrolled equipment, parts or materials	(ADM) Inspection of site (ADM) Qualified operator on equipment
	(E) Asbestos dust	(ENG) Wet items / area to eliminate dust (PPE) Wear proper PPE
	(CW) Biological hazards	(ADM) Employee Training (PPE) Wear work gloves and proper PPE
	(E) Physical Hazxards	(ADM) Proper housekeeping procedures
	(SO) Lifting injuries	(ADM) Instruction in proper lifting techniques
	(FS) Slips, Trips and Falls	(ADM) Keep areas free of tripping hazards (ADM) Proper housekeeping procedures

Hazard Codes:

CBe – Caught Between
CBy – Contacted By
CW – Contact With
E – Exposure
FB – Fall Below Level
FS – Fall Same Level
SBy – Struck BY
TI – Trapped IN

Recommended Solution Codes:

ADM – Administrative Control
ENG – Engineering Control
PPE – Personnel Protective Equipment

KES

HAZARD ANALYSIS

TASK: Residential Clean Up

JOB TITLE: Laborers, Operators

MINIMUM PERSONNEL PROTECTIVE EQUIPMENT TO BE USED: Level D - Hardhat, Safety-Toed work boots, safety glasses, hearing protection if warranted and standard work clothes (shirts must be at least short sleeved and full length pants). Modified Level D and Level C as indicated in Health and Safety Plan.

JOB STEPS	HAZARDS	RECOMMENDED SOLUTIONS
1. Removal of items from structures, sorting and placement of items in temporary storage. HEPA vacuuming, wipe downs, insulation removal.	(SBy) Loose / uncontrolled equipment, parts or materials and debris	(ADM) Inspection of site prior to beginning work for possible need of specialized equipment.
	(E) Asbestos dust	(ENG) Wet items / area to eliminate dust (PPE) Wear proper PPE
	(CW) Biological hazards	(ADM) Employee Training (ADM) Employee Safety Meetings (PPE) Wear work gloves and proper PPE
	(E) Physical hazards	(ADM) Proper housekeeping procedures
	(CW) Work site debris, rough surfaces, sharp edges	(PPE) Wear work gloves (ADM) Proper housekeeping procedures
	(FS) Slips, Trips and Falls	(ADM) Keep areas free of tripping hazards (ADM) Proper housekeeping procedures

Hazard Codes:

CBe – Caught Between
CBy – Contacted By
CW – Contact With
E – Exposure
FB – Fall Below Level
FS – Fall Same Level
SBy – Struck BY
TI – Trapped IN

Recommended Solution Codes:

ADM – Administrative Control
ENG – Engineering Control
PPE – Personnel Protective Equipment

KES

HAZARD ANALYSIS

TASK: Soil Excavation, Loading and Backfilling	**JOB TITLE:** Laborers, Operators

MINIMUM PERSONNEL PROTECTIVE EQUIPMENT TO BE USED: Level D - Hardhat, Safety-Toed work boots, safety glasses, hearing protection if warranted and standard work clothes (shirts must be at least short sleeved and full length pants). Modified Level D and Level C as indicated in Health and Safety Plan.

JOB STEPS	HAZARDS	RECOMMENDED SOLUTIONS
1. Excavate, load, backfill and spread imported soil	(SBy) Loose / uncontrolled equipment, parts or materials and debris	(ADM) Qualified operator on equipment (ADM) Inspection of site prior to beginning work for possible need of specialized equipment. (ADM) Safety inspection of equipment
	(E) Asbestos dust	(ENG) Wet items / area to eliminate dust (PPE) Wear proper PPE
	(CW) Biological hazards	(ADM) Employee Training (ADM) Employee Safety Meetings (PPE) Wear work gloves and proper PPE
	(E) Physical hazards	(ADM) Proper housekeeping procedures (ADM) Employee Safety Meetings

Hazard Codes:

CBe – Caught Between
CBy – Contacted By
CW – Contact With
E – Exposure
FB – Fall Below Level
FS – Fall Same Level
SBy – Struck BY
TI – Trapped I

Recommended Solution Codes:

ADM – Administrative Control
ENG – Engineering Control
PPE – Personnel Protective Equipment